JPRS 70495

17 January 1978

# USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS

## CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY

## No. 29



**U. S. JOINT PUBLICATIONS RESEARCH SERVICE**

## NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

## PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22151. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available through Bell & Howell, Old Mansfield Road, Wooster, Ohio, 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

| BIBLIOGRAPHIC DATA SHEET | 1. Report No. JPRS 70495 | 2. | 3. Recipient's Accession No. |
|---|---|---|---|
| 4. Title and Subtitle<br>USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS - CYBERNETICS, COMPUTERS, AND AUTOMATION TECHNOLOGY, No. 29 | | | 5. Report Date<br>17 January 1978<br>6. |
| 7. Author(s) | | | 8. Performing Organization Rept. No. |
| 9. Performing Organization Name and Address<br>Joint Publications Research Service<br>1000 North Glebe Road<br>Arlington, Virginia 22201 | | | 10. Project/Task/Work Unit No.<br>11. Contract/Grant No. |
| 12. Sponsoring Organization Name and Address | | | 13. Type of Report & Period Covered<br>14. |

15. Supplementary Notes

16. Abstracts

The report contains abstracts and news items on theory, design, development and application of analog and digital apparatus, elements and components of control systems, reliability and optimality, information theory, and the theory of automata.

17. Key Words and Document Analysis. 17a. Descriptors

USSR
Eastern Europe
Automation
Automata Theory
Information Theory
Computers
Computer Programming

17b. Identifiers/Open-Ended Terms

17c. COSATI Field/Group 6D, 9B, 9D

| 18. Availability Statement | 19. Security Class (This Report) | 21. No. of Pages |
|---|---|---|
| Unlimited Availability<br>Sold by NTIS<br>Springfield, Virginia 22151 | UNCLASSIFIED | 95 |
| | 20. Security Class (This Page) UNCLASSIFIED | 22. Price PC $4.05 |

FORM NTIS-35 (10-70) USCOMM-DC 40329-P71

JPRS 70495

17 January 1978

# USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS

## CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY

No. 29

This serial publication contains abstracts of articles and news items from USSR and Eastern Europe scientific and technical journals on the specific subjects reflected in the table of contents.

Photoreproductions of foreign-language sources may be obtained from the Photoduplication Service, Library of Congress, Washington, D. C. 20540. Requests should provide adequate identification both as to the source and the individual article(s) desired.

CONTENTS PAGE

CONTENTS (Continued) Page

USSR UDC 681.3.06-681.39

# SOME FEATURES OF THE STATE OF THE ART OF COMPUTER DESIGN AND TECHNOLOGY AND TRENDS IN ITS DEVELOPMENT

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6, 1976 pp 29-37 manuscript received 23 Aug 76

DERKACH, VITALIY PAVLOVICH, dr in technical sciences, Institute of Cybernetics, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] The state of the art of third-generation computers and the future of computer design and technology require a closer relationship between computer design engineers and production process engineers involved in developing and manufacturing large integrated circuits. The traditional line dividing these two spheres of activity must be broken for further progress. This paper traces the development of computer design and technology, beginning with advances made in microelectronics at the end of the 50's and beginning of the 60's. Various stages in the development of integrated circuits throughout the last decade are discussed in detail, with emphasis on the effect of this development on the reliability of computers, their size, cost, capabilities, and design. The trend in the last decade has been toward increasing the number of components and decreasing the volume occupied by integrated circuits, while reducing their power consumption and cost and increasing their response. The development of standard plug-in integrated circuit boards led to a new approach to designing computers: Formal mathematical methods were applied and computers themselves began to be widely used in designing other computers. A great deal of work has been done and is now being done at scientific research institutes on finding new techniques for designing large integrated circuits. As a result of this work it has become possible to create large integrated circuits containing thousands of interconnected simple logic circuits on a single crystal. Large integrated circuits, now the basis for computer design, have created new problems, mainly that of nomenclature. The problem is how many components, and of what sort, to put on a single crystal. Too many components result in waste of those unused in a specific application, whereas too few, or the wrong ones, result in a demand for an enormous variety of large integrated circuits with narrowly specialized applications. The various sides of this problem are discussed in detail. Great advances have been made in the Ninth Five-Year Plan period in automating the design and manufacture of large integrated circuits. The development of computer technology and microelectronics have become more closely allied and interdependent. Some of the new problems which must be solved are the development of methods for jointly designing hardware and software for it, of methods for efficiently dividing solutions which can be implemented on the circuit and program level, and of methods for systems, unit, algorithmic, and logical-function design of computers which are closely allied with methods for designing large integrated circuits from the circuit-design, topological, and technological standpoint.

USSR

UDC 001.57:(338.42+33)

ONE CLASS OF DYNAMIC MACROECONOMIC MODELS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Mar/Apr 77 pp 3-6 manuscript received 11 Nov 76

GLUSHKOV, VIKTOR MIKHAYLOVICH, academician, IK AN USSR [Institute of Cybernetics, Ukrainian SSR Academy of Sciences], Kiev

[Abstract] This work presents a description of dynamic macroeconomic models using systems of integral equations, eliminating the shortcomings of earlier models, which were inconvenient because actual macroeconomic systems are described by unsteady and even discontinuous functions which could not be modeled adequately by the ordinary differential equations the earlier models used. A simple two-product model is used to explain the basic ideas of the new model. The equations in the model reflect the movement of fixed capital, labor resources and the funds of consumers. Analysis of the model indicates that at the present time the average complexity of production of tools and of consumer goods is approximately the same. This allows the model to be simplified somewhat. References 2 (Russian).

USSR

UDC 681.3.06

ALGORITHMIC COMPLETENESS AND COMPLEXITY OF MICROPROGRAMS

Kiev KIBERNETIKA in Russian No 3, May/Jun 77 pp 1-15 manuscript received 22 Dec 76

GOLUNKOV, YURIY VALENTINOVICH, candidate in physico-mathematical nauk, Dotsent, UkrSSR Academy of Sciences, Kiev

[Abstract] The mathematical theory of the planning of computer structures and software systems developed by V. M. Glushkov is based on such interconnected concepts as the composition of control and operational automata, discrete converters, automatic program representation, multiple-register finite-period automata, systems of algorithmic algebras, and the abstract automaton approach to the determination of the completeness of a system of computer operations. This review is dedicated to the completeness of systems of computer operations and the complexity of microprograms. The first section presents a description of these approaches to the concept of completeness of computer operation systems, primary attention being concentrated on computer models with an infinite set of states of memory locations. The second section contains a review of results on the completeness of systems of operations in machines with finite memory, the locations of which may store elements of a finite set. Section three studies problems related to estimation of the complexity of programs in such machines (microprograms), including problems of absolute completeness. Section 4 is dedicated to various methods of hardware realization of complete systems. Figures 6; references 68: 60 Russian, 8 Western.

USSR

ROLE OF SCIENCE AND COMPUTERS IN INDUSTRY DISCUSSED

Moscow TRUD ("A Great Nation's Science") in Russian 4 Oct 77 p 2

GLUSHKOV, V., academician, Hero of Socialist Labor, Vice President Ukrainian SSR Academy of Sciences, Director Institute of Cybernetics, Ukrainian SSR Academy of Sciences, Deputy Supreme Soviet SSSR

[Text] With an extraordinary sense of agitation, happiness and pride, and tremendous personal responsibility, I arrived at the special session of the Supreme Soviet of the USSR. The adoption of a new Basic Law is indeed an historic event which will have a great significance not only for our country, but will also exert a definite influence on conditions throughout the world. The design for the new Constitution of the USSR was developed on a profoundly scientific basis and with the active participation of the broadest mass of workers. During a recent meeting with my electors--workers of industrial Khar'kov--I was given a concise order: support and adopt the new Constitution, the outstanding historical document of our time.

As a representative of a large detachment of scientists, I am especially gladdened that the questions concerning the role of science in our society and its continued development are being given significant attention in the design of the Basic Law. In Article 26 it says directly, "In conformity with the needs of society, the state guarantees the systematic development of science and the training of scientific personnel, and will organize the introduction of the results of scientific research into the national economy and other spheres of life." And Article 47 guarantees the freedom of scientific, technical and artistic creative genius.

During the years of Soviet power, especially during the latest Five-Year-Plans, a powerful industrial base has been created for the development of science. Here are only a few figures. Last year the government earmarked billions of rubles for the development of Soviet science. In addition to that of the Union budget, more than 178 million rubles were assigned by the state budget of the Ukrainian SSR to the scientific needs of the republic. Together with the resources which are singled out by the enterprises in accordance with the agreements with the institutes, design bureaus (KB) and laboratories, Ukrainian scientific establishments will receive an additional 251,400 thousand rubles.

Convincing evidence of the genuine freedom of scientific and technical creative genius in the country is the fact that one scientist in four in the world is Soviet. In recent years the public sector of science has expanded immeasurably; creative activity, initiative and the enthusiasm for work by the scientific-technical intelligentsia, leaders and innovators of industry have grown. Nearly half of the 113 thousand primary organizations of the country's Scientific and Technical Society has assumed the functions of technical and economic, and vocational and technical advice for the enterprises.

The remarkable blossoming of science and its harmonious and systematic development have been typical for all sister republics, including also the Ukraine. One hundred and fifty thousand highly skilled scientific collaborators work at present in the institutions of the Academy of Sciences of the Ukrainian SSR, in the branches of the scientific-research institutes, in the

theoretical and research and development organizations, and in the republic's higher institutes of learning. Today they labor over the development of approximately 500 major scientific-research and experimental subjects. In the current Five-Year Plan alone, Ukrainian industry will benefit economically in the amount of some 5 billion rubles from the introduction of new technology.

Many fine, vigorous scientific collectives have been put together in the republic. This affects, for example, such an important area as materials technology and the creation of new materials. A relatively new specialization in Ukrainian science is cybernetics and computer technology. Twenty-six years ago, under the leadership of Academician S. A. Lebedev, we produced the first electronic computer on the European continent. Since then in a comparatively short time, powerful scientific centers have grown up, and a great cycle of fundamental investigations has been performed.

A grossly incomplete listing of problems on which we are working includes increasing the capabilities of second and third generation electronic computers, creating machines capable of executing up to a billion operations a second, using them for the automation of complex, time-consuming industrial processes, and developing multipurpose robots which would replace manual labor--this is by far not a complete list of problems on which we are working.

Today a variety of first generation robots already labor in industry. For example, a management system for the "Arsenal" plant's galvanizing shop was successfully developed. The participation here of "electronic intellectuals" allowed not only an increase in productivity of 60-70 percent, but also--and this is significant--totally eliminated the need for men to work in this unhealthy shop. No lesser effect was yielded by the "Svarog" system which we created jointly with the Institute of Electric Welding of the Ukrainian SSR Academy of Sciences. The productivity of welding operations was sharply increased, and heavy manual labor either lightened or completely eliminated.

Second generation robots possess great "intellectuality." They are provided with "sensory" devices, primarily "vision" that allows them to be effectively guided in the industrial sector. A robot is capable of "dismantling" an object wherever it lies; it can find a necessary component, pick things up with its "hand," loosen and tighten screws, grasp with varying force, and perform operations not only, let's say, in the processing of components, but also in their assembly. It can perform multipurpose operations. A new generation of robots has been called upon to ease the load of unskilled labor, and where possible completely replace man. Therefore, the problem is to remedy the paradox, which originated at a previous stage of automation, when the task of replacing highly skilled labor in basic production was decided. Simultaneously, secondary operations (and these in particular lower productivity significantly) remained outside the purview of scientists.

A humanistic goal--to ease the work of the economist, and replace unskilled and uninteresting work with machines--is being served by yet another innovation of ours, the creation of "Displan" jointly with associates from other institutes. This is a dialogized system of planning. The computer has become a complicated part of planning, having "loaded" on itself all the "dirty" work. As the calculations reveal, economists with the aid of "Displan" are able to accomplish in tens of minutes what normally consumes weeks.

Science has become in ever greater measure a direct productive strength. In the historical document--the design of the new Constitution of the USSR--not only is the growing role of science in the life of society reflected, but also conditions for its future development are guaranteed. And all this for the good of mankind, and in the name of the future.

USSR

NEW TYPES OF ELECTRONIC APPARATUS BASED ON MICROELECTRONICS AND LASER TECHNOLOGY

Moscow PRAVDA in Russian ["Facets of Crystal Ball"] 16 Oct 77 p 3

FEDOTOV, YA., Lenin Prize Laureate, dr in Technical Sciences, Professor

[Abstract] This popular article describes the evolution of semiconductor technology from first-generation transistors which "saved the computer from an early death," through microelectronics, large-scale integrated circuits and the application of optical methods and lasers to electronics. Using broad stokes, the author paints a picture of the future role of microelectronics in Soviet life, describes briefly some of the techniques used for the manufacture of microelectronic circuits and a few of the uses to which these circuits can be put--from the manufacture of pocket calculators through automation of combersome and tedious processes by the use of third generation computers.

USSR UDC 62-181.4:681.322

# THE FAMILY OF DOMESTIC WIDE-PURPOSE MICROCOMPUTERS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6, 1976 pp 27-29
manuscript received 6 Sep 76

GAL'PERIN, MARK PETROVICH, candidate in technical sciences, "Svetlana" Association, Leningrad, ZHUKOV, YEVGENIY IVANOVICH, engineer, "Svetlana" Association, Leningrad, KUZNETSOV, VLADIMIR YAKOVLEVICH, engineer, "Svetlana" Association, Leningrad, MALINOVSKIY, BORIS NIKOLAYEVICH, corresponding member of the Ukrainian SSR Academy of Sciences, Ukrainian SSR Academy of Sciences Institute of Cybernetics, Kiev, MASLENIKOV, YURIY ALEKSANDROVICH, engineer, "Svetlana" Association, Leningrad, PALAGIN, ALEKSANDR VASIL'YEVICH, candidate in technical sciences, Ukrainian SSR Academy of Sciences Institute of Cybernetics, Kiev, and PANKIN, VLADIMIR YEFIMOVICH, candidate of technical sciences, "Svetlana" Association, Leingrad

[Abstract] This paper centers on a fundamental contradiction: Microcomputers, based on large universal integrated circuits, have been produced faster than it has been possible to find applications for them. They were developed for the purpose of breaking the cost barrier, for applications in types of manufacturing in which the cost of equipment to be controlled is comparatively low and the use of expensive control computers is not justified. This paper argues in behalf of the creation of systems for these new computers before embarking on mass production of them, for tailoring systems to be developed for specific industries and areas of application. The family of domestic microcomputers is broken down into two different types: Single-board and multiboard models. Single-board models are designed as plug-in control and data processing modules and have a limited memory capacity and limited number of digital data input and output channels, but have add-on and hookup capability. Multiboard models are designed to replace minicomputers and do not differ from them in terms of design concept and application. They are built from boards which are functionally complete, i.e., the processor occupies a single circuit board, the analog-digital converter another, and so on. Single-board and multiboard models are identical in all other aspects, such as instruction repertoire and software, which greatly facilitates and imparts wide scope to the design of systems. A brief description is given of the software which has been developed for microcomputers, which includes the following three systems: SARP (system for automating program development), SARM (system for automating microprogram development), and SUF (system for controlling microcomputer functioning). SARP and SARM make it possible to write special-purpose programs using symbolic coding languages and to debug these programs with universal computers. SUF makes it possible to operate a control system based on microcomputers and furnished with a specific set of standard peripheral gear. SUF operates in the microcomputer's permanent memory and is its program equipment. Three variations of a debugging system are detailed to take into account the diversity of microcomputer control systems and configurations. The need for coordination in the development of microcomputers and in their introduction into manufacturing is stressed, for at present computers become outdated before they are finally put into operation. A flowchart for steps in this coordination process between designers and users is presented. It is suggested that special centers be created, devoted to microcomputer applications and tailoring of microcomputer systems to specific needs. Figure 1.

USSR UDC 658.5.011.56

# THE SCIENTIFIC AND TECHNICAL LEVEL OF INDUSTRIAL AUTOMATED MANAGEMENT SYSTEMS CREATED IN THE UKRAINIAN SSR AND WAYS OF RAISING IT

Kiev MEKHANIZATSIYA I AVTOMATIZATSIYA UPRAVLENIYA in Russian No 6, 1976 pp 27-31 manuscript received 13 Jun 76

MIKULICH, YU. N., candidate in economic sciences

[Abstract] Technical-economic studies of the state and prospects of the development of OASU's industrial automated management systems] in the Ukrainian SSR made by UkrNIINTI [Ukrainian Scientific Research Institute of Scientific and Technical Information] have indicated that these systems are of a comparatively low scientific and technical level. The NTU [scientific and technical level] is an overall indicator showing to what extent the technical and economic indicators of the OASU being studied conform to its stated purpose, modern achievements of science and technology, and the needs of the national economy. The mean NTU for Ukrainian OASU's is 3, on a scale of 10. Seventy-four percent are below average and 26 percent are average. This is caused by insufficient development in terms of software, hardware, systematization, data, and functioning. This paper is concerned with the level of the most important factors influencing the NTU of an OASU and with ways of raising this level. Insufficient attention has been devoted to the development and implementation of product quality control subsystems. Further development should be given to problems of optimization and forecasting. Subsystems such as "Future Development of the Industry," "Technical-Economic Planning," "Control of Product Quality," and "Control of Capital Construction" should be added to widen the range of automated problems. Hardware has also had a negative influence on the NTU. OASU's introduced in the Ninth Five-Year Plan utilized second-generation computers, mainly the "Minsk-22" and "Minsk-32," with an average 24-hour workload of 12 to 14 hours. The capabilities of second-generation computers in solving the problems of an OASU are quite limited. Plans were made in the Ninth Five-Year Plan to convert to series YeS and ASVT-M computers, which have a wide assortment of hardware, the capability of simultaneously solving an entire set of problems and of remotely serving many users, and program compatibility and advanced software. This will make it possible, using these third-generation computers, to build multifunctional computing complexes with great capabilities for solving OASU problems. Greater use should be made of the multiple-user system on the part of ministries and departments. Remote data processing units should be added. Individual data arrays should be created for subsystems and a data bank for the entire system. Further work must be done in the area of using standard programs and universal software. Development time and costs for OASU's must be reduced. Developments of current system prototypes, such as the "ASU-Pribor II," should be taken into account in creating OASU's. Earlier created systems must be improved (evolved) and new ones created. References 3 (Russian).

USSR UDC 681.142.2

USE OF PROBLEM-ORIENTED LANGUAGES IN MANAGEMENT OF TECHNOLOGICAL PROCESSES

Moscow PROGRAMMIROVANIYE in Russian No 1, Feb/Mar 77 pp 42-48 manuscript received 3 Dec 75; after revision 15 Sep 76

GOLOVACH, V. I.

[Abstract] The author investigates the features of contemporary problem-oriented languages designed for control of technological processes. Because of the necessity for overall control of these processes the question arises as to the development of a unified procedural language to control them. Such a language may possibly consist of several dialects or may contain sublanguages. The existence of such a language would not only permit coordinating the work of the system programmers but would also permit creating a strong methodological base for development of an ASUTP [automated management system for technological processes]. Because of its high level the KAUT language may serve as a convenient base for developing such a unified language. References 10: 4 Russian, 6 Western.

USSR UDC 549+550.4

MINERALOGICAL-GEOCHEMICAL STUDIES USING A FACTOGRAPHIC INFORMATION RETRIEVAL SYSTEM

Leningrad ZAPISKI VSESOYUZNOGO MINERALOGICHESKOGO OBSHCHESTVA in Russian Series 2 Part 106 No 2, 1977 pp 252-259 manuscript received 8 Jun 76

MISHIN, V. I., All-Union Scientific-Research Geological Institute (VSEGEI) and SKUBLOV, G. T., Leningrad State University

[Abstract] The problem of creation of automatic geological data processing systems, including a specialized operational system, data bank or problem-oriented information system (factographic information retrieval system - FIPS) for the formulation, storage and management of the data bank which supports retrieval and output of data in the bank, as well as maintenance of the library of computational and service program modules, is a pressing one. One automated system has been created at the Information-Computer Center of the All-Union Scientific-Research Geological Institute, the ASOGI [Automated System for Processing of Geological Information] including FIPS as a component part. The operational system of ASOGI receives, tests and runs batches of computation process control operators and maintains information communication between the data bank and program library. FIPS is distinguished by its simple coding system, which takes into consideration the specifics of geological jobs, its flexible structure and practically unlimited capabilities for retrieval and processing of documents. Specific examples are used to study the principles of the composition of FIPS requests and the capabilities of

the system for geological research problems. Years of operating experience with FIPS indicate that many geological jobs can be performed using this system, which is also quite effective in geological-geochemical research. References 13 (Russian).

USSR UDC 51:65.012.122

OPTIMIZATION METHODS IN ECONOMICS: RESULTS, DIFFICULTIES AND PROSPECTS

Kiev KIBERNETIKA in Russian No 2, Mar/Apr 77 pp 68-72 manuscript received 10 Nov 76

KANTOROVICH, LEONID VITAL'YEVICH, academician, Division Chief, Institute of System Analysis, Moscow; and ROMANOVSKIY, IOSIF VLADIMIROVICH, Dr of Physico-Mathematical Sciences, Professor, Leningrad State University

[Abstract] Because the authors believe that there is a gap between the rapid development of individual areas of mathematical programming and the practical application of the results of this development, they analyze from the standpoint of practice the mathematical trends which are actually used in practice, what hinders application of other areas and what areas require further development. Economic applications are specifically discussed. Areas covered include linear programming, the transportation problem, dynamic and discrete programming, combinatorial problems, the problem of meshing of territorial and industry-branch planning and optimization of the software used by automated management systems. Automated management system software development is considered an extremely pressing problem. The paper is written according to material in a report delivered at the Ninth International Conference on Mathematical Programming, held at Budapest in August 1976. References 23: 22 Russian, 1 Western.

USSR UDC 681.327

DIGITAL INFORMATION CONSOLE

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, 1977 pp 12-13

STRYUCHENKO, G. N., PIKULIK, V. A., CHERNONOG, L. I., and SIBIKINA, G. P., engineers

[Abstract] In ASU's [automated management systems] about 15 percent of the raw data at work places is entered manually, but there has been a lack of appropriate manual consoles, resulting in a considerable lowering of the efficiency of ASUTP's [automated systems for controlling technological processes]. Development and manufacture of this type of equipment have been hampered by conflicting requirements on the part of customers and the tendency of this equipment to become rapidly obsolete. This paper describes a console for manual entry of digital information (PTsI) developed and mass produced by NII UVM [Scientific-Research Institute of Control Computers] in Severodonetsk. This console is designed for direct interaction between man and an ASU computer and is part of the peripheral equipment for the ASVT-M. It is used at work places having raw data which require direct entry into the computer, such as values of technological parameters which change slowly over time, estimating and accounting data for controlling technological processes, and administrative management operations and accounting data. It is designed for use in stationary, closed and heated areas with temperature within 5 to 40°C and relative humidity not exceeding 90 percent (at 30 $\pm$ 2°C). It is hooked up to the computer via a BIF-54 interface. Its alphabet consists of 16 characters; maximum data entry speed in characters per second--five; symbol coding--binary; number of characters per word and number of words per message--arbitrary; power requirement no greater than 120 V-A; overall size--486 X 168 X 515 mm; weight--22 kg. The PTsI's circuit is designed with nine pull-out modules made from standard printed circuit boards. Provision has been made for plugging in an EUM-23 electronically controlled typewriter. When this is done, data can be recorded as it is being transmitted to the computer and as it is being received from the computer; also, documentary data can be exchanged between two work places by using two independently operating consoles. Data is entered with a keyboard which has three auxiliary keys, 12 data keys, and two editing keys. This console utilizes the method of transmitting data by changing the value of the direct current in its connecting line, i.e., with unity represented by presence of the rated current in the line and zero by its absence. This console is designed for versatility and can be used in ASU's for different enterprises, and especially for those with digital-process forms of production. Figures 4.

## D. Unified System or Ryad Series

USSR

SERIES PRODUCTION OF YES-1060 COMPUTER BEGUN

Riga SOVETSKAYA LATVIYA in Russian ("A Computer of Great Possibilities") 14 Aug 77 p 1

[Text] One and a half million operations per second--such is the operating speed of the new YeS-1060 computer created by Soviet specialists. Series production of these computers has begun at the Minsk Industrial Association of Computer Technology.

"The new electronic computer leads the class of powerful machines of the unified family created by CEMA member-countries," I. K. Rostovtsev, general director of the association, comments "With regard to productivity, it can replace 100 computers of the Minsk-32 model. On the basis of one such computer one could establish a computer center to serve an entire sector of the country's national economy. It is within its power to serve hundreds of enterprises and institutions all at once, to solve for them economic-planning, statistical and engineering problems and other problems of great complexity. During the current five-year plan, Belorussia will increase its output of computers 2.6 times."

USSR

UDC 681.327.67

# STRUCTURE OF OPTOELECTRONIC IMMEDIATE ACCESS MEMORY AND ESTIMATE OF ITS SPEED

Moscow AVTOMATIKA I TELEMEKHANIKA in Russian No 12, 76 pp 136-142 manuscript received 15 Jul 75

KITOVICH, V. V., POSPELOV, V. N., and TARAYAN, I. S., Moscow

[Abstract] An optoelectronic hierarchical memory system including a multipage buffer as the high-speed component is a possible solution to the problem of building high-speed optoelectronic immediate access memories. The block diagram of a proposed high-speed optoelectronic immediate access memory includes: spatially separated matrices of photocells and photochannels, a multipage buffer memory, units and devices for optical and electrical data reentry and a device for monitoring this hierarchy of memory units. Expressions are derived for estimating the mean speed of these memories and a system of recurrence relations for computer simulation of the memory units. Figures 2; references 9: 3 Russian, 6 Western.

HUNGARY

THE TIME-SHARING OPERATING SYSTEM OF THE R-10 SMALL COMPUTER. PART 2

Budapest INFORMACIO ELEKTRONIKA in Hungarian Vol 12 No 1, 1977 pp 19-24

NEMETH, JOZSEF, main scientific department head, Research Institute for Telecommunication

[Abstract] This part of the series of articles discusses the organization of the background memory access, the organization of the processes, the information base of process administration, the synchronization of the processes, scheduling, data moving, terminal input and output, computer-to-computer connections, system generation, and experiences with the use of the system, stressing the realization phase of the system. Insofar as access is concerned, the alpha-numeric designation of a segment (determined by the application and the user) and the identifier of the segment within the system are fully separate; this imparts a high degree of elasticity to the system, not achievable with any other access approach. The most complex part of the system is the algorithm aiming at ensuring the fullest possible utilization of the computation capacity of the central unit and the operative memory. Much attention was paid in order to ensure that the data carriers can be fully interchanged. As a result, the R-10 TST is an elastic system, capable of serving widely varying configurations, and may be used as the base for a wide spectrum of application systems. Initial experiences are used for the ongoing development of the MOSAIC (Modular Operating System Assembled from Independent Components). Figures 6.

HUNGARY

COMPUMETRICS. PART 3: HARDWARE MONITORS

Budapest INFORMACIO ELEKTRONIKA in Hungarian Vol 12 No 1, 1977 pp 48-53

TERPLAN, KORNEL, dr, senior system designer, Computer Technology and Administration Center, MHE [Hungarian Shipping Association]

[Abstract] The hardware monitor is an important device for the measurement and evaluation of the effectiveness of a hardware system. Its function encompasses measurement of the system components and of the user programs. Measurement is accomplished by counting and duration determination, or a combination of the two. The following operations are involved: collection of data, reduction of data, and off-line processing of the data. Development trends include systems using virtual memory, improved data collection and reduction methods, and development of hardware monitors for fourth-generation computer systems (divided measurements, ability to evaluate data-communication systems, modular design, utilization of the potentialities if microprogramming for data collection, and inclusion of the displays in the hardware-

monitor configuration). The article briefly discusses the various functions and realization approaches of the presently used hardware monitors. The installation of hardware monitors yields many advantages to the hardware user. Figures 6; references 11: 2 Hungarian, 1 Yugoslav, and 8 Western.

USSR UDC 681.142

# SYNTHESIS OF THE OPTIMUM CONFIGURATION OF A COMPUTER COMPLEX

Riga AVTOMATIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 1, Jan/Feb 77 pp 52-58 manuscript received 16 Mar 76

ETTINGER, B. YA., and YANBYKH, G. F.

[Abstract] This work presents a further development of results produced in an earlier article by the authors, for solution of the problem of synthesis of the optimal configuration of a homogeneous computer complex (VK). The configuration of the VK is determined by the composition and interconnections of its functional modules (processors, I/O devices and channels, internal and peripheral storage). A VK is studied which consists of one or more identical processors with a common main memory and a stream of jobs common for all processors. The main memory is rigidly zoned, the number of zones corresponding to the level of multiprogramming for which the operational system (OS) is set. Page-turning organization of the VK memory is assumed. Pages are called up by request by each zone independently, using an algorithm identical for all zones. Jobs arriving for processing by the VK are statistically homogeneous. The dimensions of the main memory zones in the job programs area are identical. The OS used, control program area, as well as volume and placement of OS transits in peripheral memory are known. The configuration of the VK is optimum if it can perform jobs satisfying preassigned requirements with respect to throughput capacity of the VK and load of the modules at minimal total cost of the complex. Synthesis of the optimal VK configuration also determines the level of multiprogramming, dimensions of zones in job programs areas and placement of pages in the hierarchical memory of the VK. A model of functioning of the VK is presented. The configuration and process of functioning of the VK are described. A method of solution of the problem of designing the VK is suggested based on the branch and bound method. Figures 2; references 11: 5 Russian, 6 Western.

HUNGARY

TYPICAL PERIPHERAL DEVICES AND METHODS FOR PERIPHERAL-DEVICE INTERFACING IN MICROCOMPUTER SYSTEMS

Budapest INFORMACIO ELEKTRONIKA in Hungarian Vol 12 No 2, 1977 pp 70-75

TOTH, ANDRAS, staff scientist, Computer Technology Coordination Institute

[Abstract] In spite of the variety of microprocessors, and microcomputers built with microprocessors as a base, and in spite of the variety of the uses to which microcomputer systems are put, there are common features with respect to their peripheral devices and methods for peripheral device interfacing. The article discusses these features, separating the interfaces according to whether they are of the "classic" type or used specifically for microcomputer systems. Among the interfacing methods, those called "handshaking" (used in the ESER [Unified Computer System]), "series" (used according to CCITT V 24), and the various "bus" systems (used by DEC [Digital Equipment Co.], IBM, etc.) are the most common. The control systems are classified as fully programmed control systems and peripheral systems operating with direct memory access. These and some development trends (intelligent interfaces, more programming flexibility, standard interfaces used to greater extent, and new LSI elements such as eight-bit input/output port, programmable periphery interface, and programmable synchronous or asynchronous data-transmission interface) are briefly discussed in this article. Figures 6; table 1; references 5: 2 Hungarian, 3 Western.

HUNGARY

SELF-DIAGNOSING COMPUTER STRUCTURES. PART 1

Budapest INFORMACIO ELEKTRONIKA in Hungarian Vol 12 No 2, 1977 pp 88-93

HARMAT, LASZLO, staff scientist, Computer Technology Coordination Institute

[Abstract] The theory of the self-diagnosing structures develops its test model on the basis of the essential features of the digital systems and computers which are of importance in connection with their diagnostic operations. It defines parameters on the model, recognizes relationships, and provides parameters. It then develops practicable procedures suitable for the diagnostic analysis and synthesis of the digital systems. The analysis ultimately provides the diagnostic capability of the given system, and also permits systems to be compared. The synthesis establishes the minimum test relationship complement to achieve the diagnostic capability of the system. The various models described in the literature for the self-diagnostic capabilities of systems (the P model, the M model, and the K model) are described, and some conditions for self-diagnosing capability are discussed. The theory of the self-diagnosing structures examines the relationships between the structure of a system composed of units which mutually test each

other, and the self-diagnosing ability of the various structures. The main definitions (structure, system, error, test, system syndrome, invalidation, control center, detection, error diagnosis, and so forth, insofar as they pertain to self-diagnosing computer structures) are explained. Figures 3; references 14: 2 Hungarian, 12 Western.

HUNGARY SELF-DIAGNOSING COMPUTER STRUCTURES. PART 2

Budapest INFORMACIO ELEKTRONIKA in Hungarian Vol 12 No 3, 1977 pp 153-159

HARMAT, LASZLO, staff scientist SZKI [Computer Technology Coordination Institute]

[Abstract] This concluding part of a two-part series discusses the analysis and synthesis of some self-diagnosing computer structures and illustrates the theories described in Part 1 by means of selected examples. The systems are analyzed and synthesized in the P, M, and K models, so as to permit the reader to comprehend more readily the theories explained in Part 1 and to permit comparisons to be made between various models and the complexities of the various procedures. In the analysis, the diagnostic capabilities of the system are determined; the goal of the synthesis is to establish the optimum connections. The wide availability of microprocessors offers a realistic base for the establishment of multi-processor systems. The reliability of such systems increases significantly if their structure is self-diagnosing; this is the significance of the theories of the self-diagnosing systems for developers. The data developed in the study indicate that the P and M models are simplifying, and do not permit errors within the unit to be detected. The K model is general, and the P model may be regarded as a special case of it. Insofar as the evaluation of the test results is concerned, the P and K models are stricter, while the M model assumes, even for a faulty unit, that another unit it has diagnosed as faulty cannot be diagnosed as operative. Figures 8; references 14: 1 Hungarian, 13 Western.

USSR UDC 681.322.2

MAIN PRINCIPLES OF STRUCTURAL ORGANIZATION OF INPUT-OUTPUT SUBSYSTEMS OF MULTIPROCESSOR COMPUTER SYSTEMS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, 1977 pp 7-9

IVANOV, A. I., engineer

[Abstract] The main functional, structural and program features of input-output subsystems of multiprocessor computer systems are examined and classified. Typical functions performed by existing SVV [input-output subsystems] include the reception of input-output requests from the operating program, selection of appropriate control subprograms of UVV [input-output devices] from memory blocks, forming and verifying the correctness of control signals of UVV, establishing ties with a given UVV and performing operations in accordance with the input-output subprogram. Major difficulties arise when designing homogeneous SVV of MPVS [multiprocessor computer systems] in setting up efficient interfaces between components and hierarchical levels. Interfaces can be of the radial or matrix types. Descriptions and advantages of each type of interface are given. References 2 (Russian).

USSR UDC 681.3.07

BUFFER MEMORY-TO-COMPUTER INTERFACE

Kiev MEKHANIZATSIYA I AVTOMATIZATSIYA UPRAVLENIYA in Russian No 2, Apr/May/Jun 77 pp 53-56 manuscript received 2 Apr 76

SUKHOMPINOV, M. M., candidate in technical sciences, PROKOF'YEV, A. A., and SHIKHALEYEV, V. A., engineers

[Abstract] Peripheral equipment for feeding information on the state of the controlled object (in an ACUTP [Automated management system for technological processes]) into the computer suffers from much slower operating speed compared to the computer. The Institute of Automation, Kiev, developed a peripherals interface for the M-3000 computer for the Beloruskaliy automated management system of the Soligorsk Potassium Combine. A buffer memory acquiring and storing data on the number of product units, consumption of materials and so on is used as the peripheral equipment. Employing the interface permits the buffer memory to be located 5 km from the computer complex, in a setting of corrosive environment and vibrations. A block diagram is shown of the algorithm of operation of the interface. Figures 2; references 3 (Russian).

USSR UDC 681.32.06.003.12

METHOD OF ESTIMATING THE COST OF A HARDWARE COMBINATION FOR AN AUTOMATED ENTERPRISE MANAGEMENT SYSTEM (ASUP)

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, 1977 pp 3-5

GRAYFER, R. S., and MAYZUS, R. I., engineers

[Abstract] At the stage of developing the project requirements for an ASUP to be designed, it is necessary to estimate the cost of the hardware combination [Kompleks tekhnicheskikh sredstv], to be able to estimate the anticipated savings resulting from the system and to make it possible to allocate capital for acquiring hardware in good time. The problem here consists in having to estimate the cost of a KTS which has not yet been designed. Cost-estimating methods suggested thus far have shown a poor correlation between estimates of KTS costs and the parameters of the enterprise to receive the ASUP. This paper offers a standard working method of estimating the cost of a KTS at the preliminary design stage, along with a cost-estimating algorithm. The method is based on finding the components and structure of a generalized index characterizing functioning ASUP's and correlating the KTS cost of a specific ASUP with this index, particularized for the ASUP in question. The generalized index must satisfy the requirements of being able to be expressed by a single number with a convenient range of variation (preferably from 1 to 0), of taking into account characteristics which are a function of both the KTS and the enterprise, and of being based both on data on functioning ASUP's and on the project requirement data for the ASUP to be designed. The generalized index represents a function of a set containing the following members: (1) The size of the enterprise; (2) The form of production; (3) The work routine (number of shifts per 24-hour period); (4) The probability of a correct solution to a specific problem in a specific subsystem; (5) The amount of information to be processed when solving this problem; and (6) The time spent on solving this problem to provide a result in good time. Coefficients of relative significance are calculated for each of these elements, and the generalized index is expressed in terms of these coefficients. The raw data necessary for implementing the method described here are discussed. These data must be such that they can be collected once and used many times for designing new systems. It is suggested that ASUP's now in existence be grouped according to the values of the above elements (1), (2) and (3) which describe the controlled system. The generalized index and the cost of the KTS should be found for each ASUP. The cost of the KTS is obtained from records, and the generalized index is computed from the formulas given here, with the data necessary for these formulas found by analyzing existing ASUP's. In this way two sets of information will be gathered, whose elements will be interrelated in pairs. The functions of the client and systems designer in providing specific types of information are touched upon. Steps in the solution of the cost-estimating problem, using the algorithm suggested here, are detailed. Figure 1; references 7 (Russian).

USSR UDC 681.32

# M-7000 CONTROL COMPUTER COMPLEX (UVK) OF ENHANCED SURVIVAL

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, 1977 pp 8-10

GOMON, L. V., and NABATOV, A. S., engineers, and ITENBERG, I. I., candidate in technical sciences

[Abstract] A description is given of an enhanced survival computer system based on the M-7000 two-processor computer complex, which has a modular design and is designed for creating high-efficiency single- and multi-processor information, control, and computing systems operating in real time. A diagram of the arrangement of the M-7000 VK [computer complex] is shown. Its processors and multiplex channels share a common memory field and common peripherals, and they gain access to any module of the core store through a main processor--OZU [immediate-access memory unit] link and to any terminal through a main process--RVV [input-output expander] link. This type of arrangement makes it possible, among other things, to ensure high stability for the system by making it possible to redistribute the system's resources: When one processor goes out of order all problems are transferred to the other; if a channel goes out of order the processor can assume its functions. When equipment fails it can be repaired while the system is operating, by turning the power on and off for individual modules without stopping the entire system. Both master clocks and units for controlling links are powered by a system power source which does not shut off when the processor's current is cut off, making it possible for the complex to operate when cutting off the power of either processor. The degree to which information can be retained in the core store depends to a great extent on how the process for turning the VK as a whole on and off has been set up. When the complex is switched on and off, uncontrollable transient processes usually occur in logic circuits, because of uncontrolled switching of logic elements on or off, which creates false addresses to the store and, consequently, loss of information stored. To solve this problem a special power-distribution circuit has been provided which regulates the sequence for switching on and off the sources powering logic circuits and sources powering the OZU's electronics. A diagram of this circuit is given and its method of functioning is described in exhaustive detail. Emphasis is placed on the importance of preserving the functioning capacity of the system when the power supply of the unit storing systems programs is cut off. This problem can be solved in three ways, outlined here; redundancy of the store from the viewpoint of hardware is the one favored. This VK is able to continue functioning with a reduction or failure in voltage in one, and sometimes even two, of the power main's phases. The M-7000 makes it feasible to create an ASUTP [automated management system for technological processes] with enhanced stability. Multiprocessor systems are also possible. These are discussed briefly, and a diagram of one possible variant is shown. Figures 3.

USSR

UDC 681.326

# POTENTIALITIES OF THE M-7000's MULTIPLEX CHANNEL

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, 1977 pp 10-12

SOLTAN, L. M., engineer

[Abstract] A high degree of simultaneity in the operation of the processor and UVV's [input-output units] can be achieved by using a channel as the means of controlling input-output operations. A multiplex channel is used in the M-7000 UVK [control computer complex] when it is necessary to connect UVV's to the computer complex which cannot be serviced by the processor's program because they operate at great speed and do not permit delay in being serviced; to increase the efficiency of using UVV's which can in principle be serviced by the processor's program but suffer from it in terms of execution rate; and for relieving the processor when working with UVV's with high and medium response. A detailed description is given of the M-7000's multiplex channel, of methods of setting it in operation, of operations performed by the channel, and of an algorithm for the channel's operation. The channel consists of four independent and simultaneously operating subchannels, i.e., it can service up to four UVV's in multiplex fashion. Each subchannel can service any of 48 UVV's hooked up to RVV's (input-output expanders) and having access to the channel. After receiving a task, all subchannels can operate simultaneously. Inquiries from UVV's are handled in the order of their arrival. If inquiries arrive at the same time from several UVV's, the sequence for handling them depends on the number of the subchannel, i.e., a priority system is used. The channel's maximum capacity is 340,000 words per second. An operation is assigned to the channel through one or two interfaces hooked up to any concentrator (e.g., processor or RVV). When two interfaces are used the channel can be controlled by a pair of computer complexes, such as two M-7000's, an M-7000 and an M-6000, or an M-7000 and an M-6010. Each processor of any computer complex can use any subchannel. Collisions arising from an attempt to use the same subchannel have to be programmed out. When the channel is addressed by two concentrators, priority is given to that addressing first, and to that with higher priority when address is simultaneous. The channel performs the following operations: Input and output in words; input and output in bytes; setting "occupied" and "free" states; putting out a word for the state of the subchannel; and reading out the current value of the array's length. These operations are discussed in detail. The channel's operation is controlled by an automatic control unit. A scanning circuit scans all four subchannels and analyzes which one has been assigned an operation. Then an analysis is made of the readiness of the corresponding UVV. If a readiness signal is received from the UVV the automatic input-output device of the subchannel performs the operation. When all four subchannels have operated scanning begins again. A block diagram is shown for connections between units of the system and OZU immediate access memory and input-output links in a single-processor M-7000 system. The channel has highest priority in occupying links in this system. In the M-7000 system all UVV's with access codes from 16 to 63 have access to the channel; UVV's are hooked in to a free subchannel by program and only during an exchange operation, i.e., the same subchannel can serve different UVV's at different times;

the same UVV can be served by the processor and by the channel. Distributing functions in this way results in a considerable gain in the system's efficiency from the viewpoint of input-output operations. Figures 3; references 1 (Russian).

USSR UDC 681.327

ACTUATING MECHANISM REMOTE CONTROL MODULE WITH INCREASED LOADING CAPACITY

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 5, 1977 pp 12-14

CHVIROV, YU. A., RIZNYCHOK, I. D. and SOLOCHKIN, L. A., engineers

[Abstract] Discrete signal output modules intended to perform the function of two-position control of dc and ac actuating mechanisms are included in control computer complexes based on M-6000 and M-7000 processors. A module with a greater loading capacity has been developed at the NII UVM [Scientific-Research Institute of Control Computers], Severodonetsk, for the remote control of actuating mechanisms in order to give control computer complexes greater functional capabilities and the modules better technical characteristics. The model has the purpose of controlling large numbers of group transformers in systems for the selective requesting of analog data, single phase dc and ac motors, luminous displays, contactors, magnetic starters and other similar equipment. The module is made in two models, MUB-1 and MUB-2, for controlling the loading of dc and ac respectively. Figures 3; references 2 (Russian).

USSR UDC 681.327

USE OF BIFURCATION DEVICES FOR CONSTRUCTION OF DISPERSED SYSTEMS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 5, 1977 pp 14-16

GOLOVAN, N. I., engineer

[Abstract] When the control of critical and continuous production is involved and even brief disconnection of the processor is unallowable, the reliability of a single-processor M-6000 control computer complex is insufficient. The use of two-processor complexes solves that problem but presents new requirements, principal ones being a common main memory and common terminals. Because a common main storage is in principle impossible for M-6000 complexes, two main storages are provided. The bifurcating device and adapter described in the article permit connecting the external memory and terminals to both complexes. Figures 4.

HUNGARY

LOTUS: NEW BASIC SOFTWARE FOR THE REMOTE TERMINAL NETWORK OF THE ACADEMY. PART 2

Budapest INFORMACIO ELEKTRONIKA in Hungarian Vol 12 No 1, 1977 pp 14-18

ALMASI, LASZLO; KOCSIS, JOZSEF; and LEHEL, JENO, staff scientists, MTA SZTAKI [Hungarian Academy of Sciences, Research Institute for Computer Technology and Automation]

[Abstract] The LOTUS system is a basic software prepared for the handling of the batch jobs in the terminal network for a CDC 3300 computer. The terminal operator, the user of the remote station (consisting of an alpha-numeric screen, card reader, and line printer, transmits his commands (selected from the command complement of LOTUS) through the terminal screen, and LOTUS also responds through the screen by the execution of the command or messages if an illegal command has been issued. This part of the series of articles describes the commands of LOTUS and the use of system for job import (reading-in of the jobs), the job export (printout of the outputs), communication methods, password, logout, and so forth. At the present time, LOTUS operates 6 hours daily at the computer center of the Academy. Interactive job work is being performed in the RESPOND system prepared by CDC, using the teletypes attached to the system. The processing speed is 140 cards per minute and 180 lines per minute; thus, the hardware potentials and the speed permitted by the leased telephone lines used may be fully utilized. Figures 5; references 3: 2 Hungarian, 1 Western.

USSR UDC 681.3.06:51

# DIALOG SYSTEM OF AUTOMATING THE DESIGN AND DEBUGGING OF MACHINE-ORIENTED PROGRAMS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 1, Jan/Feb 77 pp 69-74
manuscript received 24 Nov 76

KONOZENKO, VLADIMIR IVANOVICH, engineer, SKB MMS IK AN USSR [Special Design Bureau for Mathematical Machines and Systems, Institute of Cybernetics, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] The purpose of this paper is to give a general description of the properties of dialog of SAPO's systems for automating the design and debugging] of machine-oriented programs and to describe the main properties of a system realized with the "Dnepr-2" UVS [control computer system]. Even partial automation of the process of creating general SMO's [software systems] in the dialog mode makes it possible to reduce considerably the time required to design them. The dialog system efficiently distributes functions between man and machine and makes it possible to make the best use of the positive qualities possessed by each. The debugging stage is the most important one in the design of large SMO's, for experience has shown that 50 to 60 percent of the costs of developing SMO's is attributable to debugging them. The dialog mode is the most efficient in debugging complex SMO's since it opens up direct access to the programmer to any part of the system to be debugged during its operation. The general criteria for the language of the SAPO are outlined, the main one being that it should be terse. It should be oriented to automating the processes of designing, modeling, and issuing documents, and first and foremost to the process of debugging systems programs. Criteria for debugging software and hardware are also outlined. General criteria are given for the structure of the SAPO, with emphasis on reduction of development time and cost. The "Dnepr-2" UVS is designed for automating the management of enterprises and consists of a "Dnepr-21" central computer complex to which it is possible to hook up as many as four "Dnepr-22" control complexes. The "Dnepr-2" combines the functions of a control computer and data processor, making it possible to combine an ASUP [automated enterprise management system] and an ASUTP [automated management system for technological processes] in a single computer complex. A description is given of the SAPO ROT [teletype-controlled debugging mode], which is the SAPO designed for the "Dnepr-2" UVS. Attention is given to this system's language, major properties, design principles, structure, and provision for facing emergency situations. References 16: 10 Russian, 6 Western.

USSR

UDC 681.3.061+681.326

# COMPOSITION AND CHARACTERISTICS OF THE PACKAGE OF SCIENTIFIC SUBPROGRAMS WRITTEN IN PL/1

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 1, Jan/Feb 77 pp 74-76
manuscript received 9 Sep 76

VASILENKO, ALEKSANDR NIKOLYAEVICH, junior research worker, Moscow, GERASIMOVICH, TAT'YANA ALEKSEYEVNA, engineer, Moscow, GORYACHEVA, TAT'YANA VASIL'YEVNA, engineer, Moscow, GORODNICHIY, VIKTOR LEONIDOVICH, candidate in technical sciences, Moscow, and DESYATNIK, VLADIMIR YUR'YEVICH, engineer, Moscow

[Abstract] The package of scientific subprograms written in PL/1 (PNP-PL/1) is one of the first language packages of general-purpose applied programs operating under control of the YeS general system. This package is a set of subprograms for solving key problems of linear algebra, numerical analysis, and mathematical statistics. The class of problems which can be solved is not limited to scientific applications but includes various engineering calculations, economic problems, control problems, and others. The package has a modular structure and can serve as the basis for creating personal libraries and as a means of expanding the systems library of the PL/1 compiler. The principles of its design, structure, and algorithmic structure were influenced by modern trends in creating similar types of program packages, in particular the SSP and SSP-PL/1 packages developed by IBM. The PNP-PL/1 consists of 132 subprograms, 9 model programs, and 8 special subprograms necessary for running the model programs. The 132 subprograms are of a purely computational nature and work with data already in the main memory. The model programs are key procedures which solve certain statistics problems and make use of a considerable portion of the package's subprograms. They are included in order to illustrate the use of subprograms, as a means of checking the package after generation, and as programs important in themselves. Functions of the three main categories of subprograms are listed. Many subprograms are interrelated, i.e., the user's procedure calls subprograms in the package and the results of running each of them serve as initial data for the next, or the subprogram called itself calls another subprogram in the package. All subprograms and model programs are written in a 60-character alphabet in DKOI [binary] code and are controlled by the operational system of a YeS computer. The sole requirement of the operational system is that there must be a complete arithmetic system in the PL/1 compiler's library. The capacity of the main memory must be not less than 128K, and there must be no less than 3 or 4 disk stores. The package's subprograms have diagnostic software for detecting and reading out certain types of errors. The structure of the package imparts a considerable degree of flexibility, using it either as a library of selected modules tailored to individual needs, or in conjunction with add-on and special-purpose modules. Further development of this package can proceed in two directions: its functional capabilities can be expanded, particularly as far as its linear algebra and numerical analysis subprograms are concerned, and fuller use can be made of the language capabilities of PL/1, especially in terms of expanding error diagnosis capabilities.

USSR UDC 681.326.1:518.5

'AVTOKOD' PROGRAMMING AUTOMATION SYSTEM FOR THE 'NAIRI-K' ELECTRONIC COMPUTER

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 1, Jan/Feb 77 pp 95-98 manuscript received 15 May 75; after completion 10 Sep 75

ELIMELAKH, YAKOV RAFAEL'YEVICH, engineer, Division of Physics of Polymers of UNTs SSSR [USSR Ural Science Center], Perm'

[Abstract] The "Nairi-K" differs from previous "Nairi" modifications by the fact that the capacity of its main memory has been brought up to 4K. However, the programming automation language which is part of the software for this series of computers utilizes only one half of the capacity of the "Nairi-K's" main memory, thus imposing considerable limitations on its users. In this paper a description is given of the "AVTOKOD" programming automation system which has been developed in order to utilize the entire main memory of this computer. Choice of a programming language of the AUTOCODE type is dictated by the relatively small capacity of this computer's main memory. The "AVTOKOD" system satisfies the following requirements: Capability of using standard subprograms of series-type computer software; setting up an individual library of standard subprograms in the form of freely interchangeable compatible packages written and debugged in the system's input language; automation of programming printout of random alphanumeric data in specific formats; editing of a corrected program in the system;s input language with readout onto punched tape; arranging for automatic monitoring of data to be entered from punched tape, because the "Nairi-K" is without built-in input monitoring. The system is made up of a programming language (the AK language) and the individual programs of the system. The input language is the machine-oriented AUTOCODE language, which makes possible a sufficient degree of programming automation with a translator of minimum size. A description is given of the AK language and a table is shown which gives a general idea of the capabilities in programming afforded by this language. A program written in AK is a sequence of this language's statements. The programs making up the "AVTOKOD" programming automation system are listed and discussed. The system contains an AK translator, a servicing program for initial preparation, listing, and editing of programs written in AK, a system for automation of documentation, a graph-plotting program, and a library of standard subprograms written in AK. The "Nairi-K" is used in enterprise management systems, and the "AVTOKOD" system has the printout capabilities required for this application. In addition, the ability the user has to assemble his own library of standard subprograms as well as to use standard subprograms from the software library for "Nairi-K" computers is stressed. Table 1; references 4 (Russian).

USSR UDC 681.3.06/12.1

BASIC STATEMENTS CONCERNING THE OKA DATA BASED CONTROL SYSTEM

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Mar/Apr 77 pp 32-35 manuscript received 29 Sep 76

ANDON, FILIPI ILLARIONOVICH, candidate in physico-mathematical sciences, IK AN USSR [Institute of Cybernetics, Ukrainian SSR Academy of Sciences], Kiev, DOBGOPOLYY VASILIY GERASIMOVICH, engineer, SKB MMS IK AN USSR [Special Design Office. (Expansion unknown) IK AN USSR], KONOZENKO, VLADIMIR IVANOVICH, engineer, SKB MMS IK AN USSR], LEBEDEV LEV BORISOVICH, engineer, NITsEBT [expansion unknown], Moscow, MAR'YANCHIK, ALEKSANDR MIKHAYLOVICH, engineer, SKB MMS IK AN USSR, RAYKOB, LEONID DMITRIYEVICH, candidate in technical sciences, NITsEVT, Moscow, SEMOTYUK, VASILIY NETROVICH, engineer, SKB MMS IK AN USSR and YAROVOY, VITALIY VASIL'YEVICH, engineer, SKB MMS IK AN USSR

[Abstract] The OKA data base control system is a group of programs utilized in the unified system of electronic computers to control both large and small data bases for various applications. According to the classification adopted by the KODASIL committee, the OKA system is a system with a base language. The principle of modular programming used in development of the system allows its basic capabilities to be supplemented. The OKA system has been developed in two stages. In the first stage, now completed, the general capabilities of the system and of the hardware required to run the system in the batch processing mode were planned. In the second stage, teleprocessing hardware and software will be developed. The designers of the OKA system will also continue the development of general-purpose information systems. In particular, a system is now under development for creation, loading and administration of data bases using the OKA system. Figure 1.

USSR UDC (65.011.56+62-52):(62-181.4+681.3.06)

THE STRUCTURAL ORGANIZATION OF ONE SPECIALIZED AUTOMATED PLANNING SYSTEM

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Mar/Apr 77 pp 78-83 manuscript received 16 Jul 75; after completion 8 Sep 76

BOYKOV, NIKOLAY VASIL'YEVICH, junior research worker, Moscow

[Abstract] A study is made of the structural organization of the SAPR [specialized automated planning system], designed for logical and hardware planning of typical replacement elements for the BESM-6 computer. The software of the BESM-6 (DISPAK operational system, DUBNA monitor system), while quite convenient for handling programs, is not very convenient for handling data. Therefore, a SAPR information library is required, allowing equal ease of handling of programs and data. A structural diagram of SAPR is presented. This system consists of a set of basic programs and data files, stored

independently in the SAPR library. The component parts of the system for planning of typical replacement elements are analyzed: the data bank, interaction language, and structure of the supervisory programs. The data bank and interaction language suggested allow a complex of supervisory programs to be created, usable for the organization of open program systems to handle the data in the bank. The complex of programs occupies about 6,000 autocoder operators. The planning system allows the hardware designer who does not understand programming languages to work in dialogue with SAPR in a language which is open for expansion. It also allows SAPR to be represented as a set of machine planning programs and data in the data bank on magnetic tape, interacting with each other in a sequence determined during use of SAPR by the planning assignment. Several plans can be generated at once. Newly developed basic programs or machine planning programs from other SAPR systems can be easily attached to the SAPR. Figures 2; table 1; references 10 (Russian).

USSR UDC 681.326.34

ONE METHOD OF TECHNICAL DIAGNOSIS OF A COMPLEX ELECTRICAL INSTALLATION

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Mar/Apr 77 pp 107-111 manuscript received 11 Aug 76

ZABARA, STANISLAV SERGEYEVICH, candidate in technical sciences, PTO VUM (expansion unknown), Kiev, ROMANKEVICH, ALEKSEY MIKHAYLOVICH, candidate in technical sciences, KPI [Kiev Polytechnical Institute], Kiev, RUKKAS, OLEG DMITRIYEVICH, candidate in technical sciences, PTO VUM, Kiev and TOLPANOV, YURIY ALEKSANDROVICH, engineer, PTO VUM, Kiev

[Abstract] A set-theory model of an electrical installation as an object to be tested is described. The task of testing and diagnosis of complex electronic devices such as third-generation computers is formulated and a new method is suggested for its solution. The method is based on generation of a factor set in which membership of elements to classes of equivalency is determined by the initial, standard document describing the correct electrical connections of the product, and a factor set representing the actual poles of the object connected in the device being tested. Two types of automatic production testing systems for series-produced computers have been manufactured on the basis of this principle. The system used in the devices tests for open and short circuits throughout each electronic device tested, utilizing the available terminals of the device. The use of the testing algorithm suggested can reduce the total number of elementary tests required, practically eliminate limitations on the sequence of placement of individual words within each sentence in memory (punch tape) and minimize information input in the start-stop mode, thus increasing the service life of the information carrier and reducing the operating time of the reading mechanism. Figures 2; references 8: 6 Russian, 2 Western.

HUNGARY

A DRAWING-MACHINE SUBROUTINE PROGRAM PACKET FOR THE R-20 COMPUTER (R-PLOTTER)

Budapest INFORMACIO ELEKTRONIKA in Hungarian Vol 12 No 3, 1977 pp 135-139

BENKO, TIBOR, Mrs, staff scientist, KFKI [Central Research Institute for Physics], and SZEKELY, VLADIMIR, dr, associate professor, Department of Electronic Devices, BME [Budapest Technical University]

[Abstract] The R-PLOTTER drawing-machine subroutine program packet was developed by the KFKI for ESER [Unified Computer System] equipment, and it may be used, with minor adaptations, for any internally or externally controlled drawing machine. The configuration used consists of the R-20 computer, 4 magnetic disk units (7.25 Mbyte each), 4 nine-track magnetic tape units, a TPA/i-R-20 interface, and a TPA/i with 8 Kword capacity. It operates in conjunction with a Computer Instrumentation Limited Type 6000/601 drawing machine. The subroutine program packet has two parts: the basic software(which contains the fundamental drawing programs) and the software for complex drawings. The program was written in the FORTRAN programming language, and it also has some assembler sub-routines not accessible to the user. The operation is briefly described and some examples of complex drawings prepared with the aid of the system are presented. Figures 6; table 1; references 5 (Hungarian).

HUNGARY

COST ESTIMATION OF SOFTWARE PREPARATION WORK

Budapest INFORMACIO ELEKTRONIKA in Hungarian Vol 12 No 3, 1977 pp 160-165

GLATTFELDER, PETER, department head, National Material and Price Bureau

[Abstract] This article discusses approaches for estimating the costs of major software preparations, based primarily on a paper of R. W. Wolverton (TRW System Development Research Institute) published in IEE TRANSACTIONS ON COMPUTERS, Vol 23 No 6, 1974/C. The cost estimations used are of the following main types: retrograde estimation, comparative estimation, ratio-based estimation, estimation based on standards, and progressive estimation. The software preparation work consists of the phases analysis, designing, programming, testing, and documentation; all must be considered separately before completing the overall estimation. The operations involved are of scientific and administrative character. Much advantage is obtained by (1) full evaluation of the internal relationships of the software design procedures; (2) detection of all pitfalls of the software cost-estimation procedures; (3) study of a directory of earlier software-development projects, preferably an updated directory; and (4) optimum utilization of the equipment and personnel available to the computer center. Continuous control is the key for successful and economical software development. Tables 3; references 1 (Western).

USSR UDC 62-50-192

EFFECT OF CHECKOUT OPERATIONS ON THE RELIABILITY OF FULFILLMENT OF ALGORITHMS IN CONTROL COMPUTER COMPLEX

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, 1977 p 13

GUBINSKIY, A. I. and AVALIANI, V. A.

[Translation of Russian abstract] Formulas for estimating the reliability of fulfillment of algorithms, taking into account the algorithm structure, organization of the computer process, form of input control and operating speed with respect to fulfillment of the algorithm. Figures 2; table 1; references 6. (c) Izdatel'stvo "Mashinostroyeniye," Pribory I Sistemy Upravkniya, 1977

USSR UDC 621.317.001.2:681.3

SIMULATION MODELING IN THE ANALYSIS AND SYNTHESIS OF MULTIBLOCK MEANS OF MEASUREMENT

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, 1977 p 16

MANDEL'SHTAM, S. M. and KHUSNUTDINOV, G. N.

[Translation of Russian abstract] Classification of methods of modeling means of measurement on an electronic computer. Factors determining the feasibility of simulation modeling. Questions of realization of methods of simulation modeling in the form of specific modeling programs. References 7. (c) Izdatel'stvo "Mashinostroyeniye" Pribory I Sistemy Upravleniya, 1977

USSR UDC 621.317.001.2:681.3.06

PROGRAM SOFTWARE FOR PROBLEMS IN AUTOMATING DESIGNING BASED ON SIMULATION MODELS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, 1977 p 17

IZAKOV, YE. T., et al

[Translation of Russian abstract] Classification of program software by levels. Makeup of a complex of programs for automated modeling of means of measurements and requirements for it. Description of the complex of automated modeling of KAMIS measuring systems. Figure 1. (c) Izdatel'stvo "Mashinostroyeniye," Pribory I Sistemy Upravleniya, 1977

USSR UDC 621.317.001.2:681.3

ORGANIZATION AND CONTROL OF MACHINE EXPERIMENTING

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, 1977 p 19

BELYAYEVSKIY, A. I., and SOLOV'YEV, A. G.

[Translation of Russian abstract] Problem of control machine modeling during the investigation of the dependence of the quality indicator on a change of the parameters of individual blocks or elements of the means of measurement. Description of planning the measurement experiment which differs from traditional methods of approach, making it possible in the absence of a priori information on the parameters of the distribution law of the quality criterion to obtain an estimate of the dependences with a precision specified before the experiment began. References 5. (c) Izdatol'stvo "Mashinostroyeniye," Pribory I Sistemy Upravloniya, 1977.

USSR UDC 621.317.001.2:681.3.06

METHODS OF DETERMINING THE DYNAMIC CHARACTERISTICS OF ANALOG MEASUREMENT MEANS AND THEIR SOFTWARE

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, 1977 p 20

BRENER, M. D., et al

[Translation of Russian abstract] Problems arising in the experimental determination of the dynamic characteristics of linear analog measurement means, and methods for their solution, based on the use of electronic computers. Description of complex of ALGOL procedures which make it possible to solve most problems encountered. Figures 3; references 4.
(c) Izdatel'stvo "Mashinostroyeniye," Pribory I Sistemy Upravleniya, 1977.

USSR UDC 621.317.7

APPROXIMATE ESTIMATE OF THE UPPER DYNAMIC ERROR IN LINEAR MEASURING DEVICES

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, 1977 p 31

MIKHAYLOV, YE. V.

[Translation of Russian abstract] Justification of simple approximate methods of estimating the upper dynamic error of measuring devices from dynamic characteristics (standardized under GOST [State Standard] 8.009-72). Derivation

of an estimate of the dynamic error by employing the properties of integral analytic functions. Examples of the proposed methods. Figure 1; references 3: (c) Izdatel'stvo "Mashinostroyeniye," Pribory I Sistemy Upravleniye, 1977

POLAND

BASIC TRANSLATOR FOR MERA-305 MINICOMPUTER

Warsaw INFORMATYKA in Polish Vol 12 No 3, Mar 77 pp 1-4

BANKOWSKI, JACEK; DOBOSZ, JAROSLAW; FIALKOWSKI, KONRAD; HALSKI, MAREK; SARNECKI, TOMASZ; and SZYMANSKI, BOLESLAW, Institute of Scientific, Technical and Economic Information, Warsaw

[Abstract] The functional features, organization and some typical solutions obtained with the use of the BASIC language translator for MERA-305 minicomputers are presented. This new translator is an expansion of the existing diskless version of the BASIC language translator for MERA-300 minicomputers. The programs designed for the latter version are suited for the new translator and the results of their operation are identical, but their software is completely different, because of the changes in limitations imposed by minicomputer MERA-300 in disk and diskless configurations. Figure 1; tables 2; references 4: 1 Polish, 3 Western.

USSR UDC 681.3.06.003.12

# EXPERIMENTAL STUDY OF THE STRUCTURE OF LABOR INTENSIVENESS OF PROGRAMMING ECONOMIC PROBLEMS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, 1977 pp 6-8

IVANOV, A. P., candidate in technical sciences

[Abstract] Information on the absolute magnitude of the labor intensiveness of programming operations involved in automating the solution of economic problems and on the distribution of this magnitude over the main steps in programming (structure of labor intensiveness) is necessary in order to serve as a basis for determining personnel requirements, with respect to categories and number of personnel. Knowledge of this distribution is also necessary to correlate programming operations with available equipment and funds and time schedules. This paper presents the results of an experimental study of this distribution in terms of languages used, ASU [automated management system] subsystems programmed, the size of programs, and the main steps involved in writing programs for solving economic problems. These main steps are: (1) analysis of the problem and comprehensive formulation; (2) algorithmization and development of program flowcharts; (3) programming of the problem per se (coding); (4) debugging programs (as a whole and individually); and (5) drawing up standard working documentation. Not much has been done in the way of studies devoted to ways of standardizing tasks involved in developing programs. An enumeration is given of the problems encountered in arranging and conducting a study of the work activities of programmers, which include the absence of documentation on labor intensiveness of individual operations, the lack of a strict definition of "economic problem," the diversity of problems with respect to nature and degree of difficulty, the absence of standard criteria for evaluating the quality of programs, individual differences in programmers with respect to experience, breadth of knowledge, and personal traits, differences in hardware structure, and fluctuations in external factors, such as new technologies and systems of documentation. The experiment was based on the questionnaire method. Four questionnaires were used. The first concerned general information on the nature of operations of the computer center in question; the second entailed a description of the problem solved; the third entailed information on the labor intensiveness of main steps in creating the program, with an indication of computer time required for translation and debugging; and the fourth determined machine time spent on solving the problem divided by the main steps in the computing processes, including time spent for preparing input data. About 350 different problems were studied in all, differing in characteristics and software. Analysis of labor intensiveness distributed over the five main steps above showed that the use of algorithmic languages, COBOL, in particular, results in an increase in the labor productivity of programmers, but in poorer volume-vs.-time characteristics for programs. On the average translated COBOL programs require 2.3 times more machine time to run than symbolic coding language (YasSK) programs. Less time is spent in writing programs in high-level languages than in debugging them. Programming efficiency can be increased by improving systems for debugging programs. The labor productivity of programmers can be increased by

speeding up writing and debugging of programs and using high-level languages. The economic efficiency of a program is determined by its conciseness and the machine time required to run it. Figure 1; tables 6; references 6 (Russian).

USSR

THE DESIGNER'S DIALOG WITH THE COMPUTER

Moscow KRASNAYA ZVEZDA in Russian 2 Feb 77 p 4

KUZ'MINA, L.

[Excerpts] N. N. Moyseyev, one of the administrators of work on the creation of automated design systems, deputy director of the computer center USSR Academy of Sciences, and corresponding member of the USSR Academy of Sciences says of creating a system of automated design:

--Several years ago, P. O. Sukhoy, an outstanding Soviet aircraft designer, came to the USSR Academy of Sciences with a request to develop such a system. He proceeded from the fact thst future progress in machine building, instrument engineering and many other areas would be impossible without this system of design. Today, automation of design is the center of attention for many specialists and has gradually made its way into a group of the most important problems associated with the utilization of computers.

From the first stages of aircraft construction, designing the aerodynamic profile of the wing has always been one of the most difficult and complex problems. The only solution for this has been repeated tests in a wind tunnel! Automated design simplifies this problem and reduces time and expenses.

The design engineer carries on a dialog with the computer. An image of the wing configuration is shown on a display screen. The machine asks a question of the engineer: "Do you like this profile?" The designer presses a button. The word "No" appears. An intensive exchange of opinions goes on. The search continues for a better wing profile for the particular type of aircraft.

Different variants of the design being created can be collectively analyzed in the automated design room. The computer displays the basic parts of the aircraft on a large screen: the fuselage, wing, the tail section; and then, it combines these parts and forms a complete outline of the plane.

The designers consult and discuss the plan, they introduce corrections and changes in the basic components and separate assemblies of the aircraft. Within a few seconds, the computer makes the necessary calculations and presents a corrected image. The electronic assistant immediately evaluates the possibility of using an aircraft, or, say, a characteristic of performance in all weather conditions, procedures in flights on probable routes, and so forth. The automated design system covers all stages of the creation of a new plane, including stand and flight testing.

All the results and data obtained for each design concept will be stored in the memory of the computer. They become a part of a unique storehouse of engineering information.

The introduction of a system of automated design requires consolidation of the efforts of engineers of all the basic technical specialties, designers, physicists and mathematicians.

Can the computer replace the designer? The answer is unequivocably no! Design is a creative process. It is a major art. The story is one of collaboration between the designer and computer technology which is called upon to help him in his creative work leaving the intuition and imagination to the man and taking only the mechanical work upon itself.

A preliminary evaluation of the effectiveness of the computerized design system's operations says that the labor productivity of design engineers will show a 5-10 fold increase and quality will be dramatically improved. Finally, the design period for aircraft and their cost will be drastically reduced.

USSR

THE COMPUTER PLANS ELECTRIC POWER NETWORKS

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 3, Mar 77 pp 53-54

FAL'KOVSKIY, O., director, Belorussian Division of "Enyergoset'proyekt" [All-Union State Planning, Surveying and Scientific-Research Institute of Power Systems and Electric Power Networks]

[Abstract] The process of planning of electric power networks and components can be divided into four main stages: statement of the problem; synthesis of plan versions of alternatives of network development; analysis and selection of versions satisfying certain technical requirements; and, finally, selection of the optimal version and decision making. The Belorussian Division of "Enyergoset'proyekt" conducted developments in 1972-1975 directed to the creation of an automated system for planning of overhead power transmission lines and transformer substations. A flow chart of the algorithm for automated planning of the mechanical portion of overhead lines is presented. The portion of the algorithm which optimizes the type and placement of line-support towers is particularly effective, achieving a savings of 1 tower for every 10 km of line length. Solution of the above problems was facilitated by the fact that the Belorussian Division obtained and installed an electronic computer of the third generation. Figures 1.

USSR UDC 681.325

SYSTEM FOR PLANNING LSI CIRCUITS FROM THE SWITCHING SYSTEM LEVEL

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Mar/Apr 77 pp 88-93
manuscript received 29 Jul 76

RUBTSOV, VALERIY PAVLOVICH, engineer, Kiev and ZHIZHKO, VLADIMIR ABRAMOVICH, engineer, Kiev

[Abstract] A description is presented of the TOPAS system for planning of large integrated circuits. The TOPAS system utilizes the concept of planning in which the topology is developed primarily by the human engineer in the design stage of planning. The computer performs the massive operations of checking input descriptions to be sure they meet the topological and technical planning requirements, transforming specialized descriptions of topology into geometric descriptions, which are then transmitted to the automated photolithographic mask manufacturing system or which are directly transformed to instructions to control technological machinery. This retreat from the goal of more complete machine planning is justified by the stage-by-stage approach to planning it allows. The planning system involves at least two stages. The overall task is replaced by limited, but rapidly achievable tasks. The software of TOPAS contains three programs and a dispatcher. Each program consists of about 1,000 AKI-T operators (6,000 instructions). The information

files occupy 2-6K. The characteristics of TOPAS are presented. The system has been operated since 1973. Figure 1; tables 3; references 10 (Russian).

USSR UDC 681.142.3

ONE METHOD OF AUTOMATION OF THE SYNTHESIS OF COMBINATION LOGIC CIRCUITS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Mar/Apr 77 pp 94-99 manuscript received 13 May 76

KIRPICHNIKOV, VIKTOR MIKHAYLOVICH, candidate in technical sciences, MRTI [? Minsk Radio Engineering Institute] Minsk, and SKLYARUV, VALERIY ANATOL'YEVICH, graduate student, MRTI, Minsk

[Abstract] The system of logical synthesis analyzed in this article is based on FORTRAN-IV. This system can effectively minimize a system of Boolean functions. An example is presented of synthesis of a code converter for a digital indicator. Repeated testing of the system has indicated that minimization of one function of six variables on a Minsk-32 computer requires not over thirty seconds of machine time, while a function of eight variables requires 10-15 minutes, of ten variables--30-45 minutes. The time required to solve these same problems on the YeS-1020 computer would be 2.0-2.2 times longer. As a function is minimized, the results can be output in graphic form. Further simplification of functions represented in MDMF is achieved by the use of parenthetical forms. These forms are produced by the use of a factoring algorithm written in FORTRAN. Figures 3; references 5 (Russian).

USSR UDC 681.325

ROUTING OF PRINTED CIRCUIT BOARDS BY MEANS OF A MODEL OF THE MOUNTING AND SWITCHING SPACE WITH A REDUCED LEVEL OF DISCRETENESS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Mar/Apr 77 pp 103-107 manuscript received 14 Jul 76

RESHET'KO, ALEKSANDR IVANOVICH, engineer, Institute of Cybernetics, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] The printed circuit routing algorithm described is a wave algorithm, in which various means are used to model the wave process in order to seek out a path connecting two objects in a certain space, frequently called the MKP [mounting and switching space]. The entire process of routing in the model used in the simulation is divided into two phases: preliminary routing, i.e., drawing of conductors not attached to the coordinate grid and precise fixation on the side of a cell; final routing with the attachment of

the conductors to the coordinate grid of the mounting plane. The general method of realization of connections in the first phase is not the same as in ordinary wave algorithms. The second phase of routing is logically closely related to the algorithmic peculiarities of evaluation of the state of occupation of a unit cell. The work is simplified if conductors can be laid at an angle of 45°. The storage capacity required for a plate measuring 200 mm x 160 mm with 96 regularly placed microcircuits is 55 K bytes for one layer and 95 K bytes for two layers. Routing of an average track requires some 10,000 single-address logical operations, so that a BESM-6 computer can make approximately 100,000 connections per second. Figures 2; references 5: 3 Russian, 2 Western.

USSR UDC 62-5:681.3:007

ARCHITECTURE OF A BATCH OF APPLIED PROGRAMS FOR PLANNING AUTOMATION

Kiev KIBERNETIKA in Russian No 2, Mar/Apr 77 pp 42-46 manuscript received 21 May 75

AMBARYAN, SOTSKAR LEVONOVICH, candidate in technical sciences, Chief of sector of Yerovan Scientific-Research Institute of Mathematical Machines; ADONTS, MARIYETTA MUSHEGOVNA, chief of group of YSRIMM; and SHUKURYAN, YURIY GAYKOVICH, candidate in physico-mathematical sciences, chief of division, YSRIMM

[Abstract] A number of systems have been developed for automation of the process of computer design. This article suggests an approach based on the design of a batch of applied programs. It is essential that the method of organization of the PROYEKT planning system developed at the Institute of Cybernetics, Ukrainian SSR Academy of Sciences has influenced the architecture of the proposed batch of programs. Four areas of design are covered by the programs: automation of microprogramming structures; automation of the generation of tests and logic simulation; automation of the design of structures; and automation of the planning of documentation. The program batch consists of independent procedures which function under the control of a supervisor program to perform the functions of the batch. Thus, the batch of programs is a control system which includes means for: realization of the process of computation of a specific planning task; servicing requirements of programming modules of the batch; optimum utilization of the main memory of the computer; supplementation and alteration of the batch; testing of the status of the batch; and diagnosis of fault and uncertainty situations during calculation. Figures 2; references 9 (Russian).

USSR UDC 681.3:65.015.3

# AUTOMATED DESIGNING OF INDUSTRIAL UTILITIES IN GENERAL PLANS OF CHEMICAL ENTERPRISES

Kiev MEKHANIZATSIYA I AVTOMATIZATSIYA UPRAVLENIYA in Russian No 2, Apr/May/Jun 77 pp 20-23 manuscript received after completion 23 Nov 76

ZAYTSEV, I. D., candidate in technical sciences, ZOZULYA, A. F. and MOVCHAN, A. A., engineers

[Abstract] Because about 70 percent of the grounds of a typical chemical enterprise is occupied by industrial utilities, reducing this percentage and cutting utilities costs is vital. Placing utilities underground is only a partial solution. Elevating utilities on stands is the other arrangement. Outlays in the general plan of a chemical enterprise are formalized in a summation formula. To simplify this planning task, the Scientific-Research Institute of Basic Chemistry [NIOKhIM] worked out a combination algorithm for designing, which employs--in analyzing and synthesizing the types of engineering utilities in the general plan--heuristic rules based on systematization of designers' experience and the requirements of construction norms. A block diagram of the algorithm was implemented on a Minsk 32 computer. Experimental introduction of the program at the institute confirmed its fairly high effectiveness. Figure 1; references 3 (Russian).

USSR

UDC 62-181.4+3.06

# ORGANIZATION OF A SERIES INTERFACE FOR A COMPLEX OF MINICOMPUTERS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Mar/Apr 77 pp 73-77
manuscript received 22 Jul 76

ZHAROVSKIY, SEMEN NAUMOVICH, candidate in technical sciences, IK AN USSR [Institute of Cybernetics, Ukrainian SSR Academy of Sciences], Kiev and BURLAKOV, MIKHAIL VIKTOROVICH, graduate student, IK AN USSR

[Abstract] An algorithm is presented for organization of a SI [series interface] system combining a number of points, each of which is equipped with a minicomputer with RH/O devices. This combination of a group of minicomputers allows more effective utilization of all of their resources to contain programs and data files, acceleration of the performance of jobs by parallel processing on several minicomputers, and allows more expensive equipment to be installed at a few of the locations, because the cost can be distributed among all the users. Flow charts of the SI algorithm in the transmit and receive modes are presented. The transmitting device forms a batch of data and its address. All other points on the group transmission channel must be in the receive state. Transmission of data is preceded by transmission of a synchronization signal, used by all receiving devices to synchronize with the transmitting device. After this the data batch is transmitted, and received by the device, the address of which is indicated at the beginning of the batch. The receiving device checks the information, corrects errors if possible, and forwards the data to the computer of I/O device, depending on the address in the batch of data. After this, a confirmation signal is sent into the line by the receiving machine, confirming that the transmitting machine can continue transmission or stop transmitting. Upon receipt of a negative confirmation signal, the transmitting machine retransmits the last batch of data. The error protection system, data format and transmission rates (1,200 - 19,200 bytes per second) are reported. Figures 4; references 5 (Russian).

USSR

UDC 62-52.011.46

ALLOWING FOR DIFFERENT TIME PERIODS OF OUTLAYS AND INCOME WHEN EVALUATING THE ECONOMIC EFFECTIVE OF AUTOMATED MANAGEMENT SYSTEMS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, 1977 pp 52-56

ITSKOVICH, E. L., dr in technical sciences, and LIVSHITS, V. N., dr in economic sciences

[Abstract] Calculation of the economic effectiveness of ASU [automated management systems] starts with the annual gain in profit and the increase in capital outlays in setting up and introducing the system. On this basis, the desired indicators are found: annual economic benefit, period of recoupment or the calculated coefficient of outlay effectiveness. However, not enough attention is given to the dynamics of the capital expenditures and the dynamics of gaining the economic effect after a system is introduced. The ASU developers are not motivated by the fastest possible development and introduction of the system. A method is proposed for calculating the economic effectiveness of ASU when outlays and profits occur in different time periods. The material of this paper was reported at the All-Union Scientific-Technical Conference "Problems of Increasing the Economic Efficiency of ASU by Enterprises and Associations" held in October 1976. Figures 2; references 5 (Russian).

USSR UDC 621.394.74+681.3

## SELECTION OF THE OPTIMUM STRUCTURE OF THE COMMUNICATIONS NETWORK BETWEEN COMPUTER CENTERS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Mar/Apr 77 pp 19-27 manuscript received 27 Oct 76

DERIY, PAVEL PAVLOVICH, engineer IK AN USSR [Institute of Cybernetics, Ukrainian SSR Academy of Sciences], KUSHNER, EDUARD FEDOROVICH, candidate in technical sciences, IK AN USSR, Kiev, STOGNIY, ANATOLIY ALEKSANDROVICH, corresponding member, Ukrainian USSR, IK AN USSR, Kiev

[Abstract] The selection of the structure of a communication network between computer centers is a multidimensional, multiple-extreme problem of optimization. The number of dimensions increases exponentially as the number of centers increases, making trial-and-error selection impossible. This article studies a system for planning of the suboptimal structure of a data transfer network for a group of computer centers. The planning system developed allows near-optimum solutions to be found with reasonable expenditures of machine time. The topology-planning system combines strict and heuristic methods. It became possible because of the development of an algorithm for directed improvement of the initial topological structure until a local minimum is found. The algorithm is based on approximation of the discrete variation in the cost of communication channels with their throughput capacity by a continuous function. Directed search for local minima is possible only when the continuous cost function is linear or concave. Problems of the methodology of planning of computer networks are studied. Detailed development will require accumulation of experience in the planning of networks under various initial conditions. Further improvement of the method will allow computation costs of determination of optimal or near-optimal solutions to be reduced. Figures 3; table 1; references 21: 5 Russian, 16 Western.

USSR UDC 007.5:518.2

## A COMPLEX OF MATHEMATICAL MODELS FOR THE INITIAL STAGES OF PLANNING OF THE CONFIGURATION OF A COMMUNICATION NETWORK FOR COMPUTER CENTERS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Mar/Apr 77 pp 27-31 manuscript received 17 Mar 76; after completion 17 Aug 76

GADASIN, VADIM ARNOL'DOVICH, candidate in physico-mathematical science VNII POU [expansion unknown], Moscow, and IVANOV, GEORGIY IVANOVICH, junior research worker, VNII POU, Moscow

[Abstract] Problems are studied related to the determination of the configuration of a communication network covering a large territory and linking computer centers. The long-term nature of deployment of the network requires

that it be planned in a number of stages. The initial stage is the most important and difficult from the standpoint of the decisions which must be made; it is characterized by the following factors: time pressure, limited material and personnel resources, uncertainty as to the basic requirements and principles of construction of the communication network and unavailability of initial data of the required reliability. These factors require that mathematical modeling be used. The development of the software required for interactive modeling is a very complex, long-term process; therefore, the portion of the service operations performed by humans must be increased. Both centralized (star) and decentralized (distributed) networks are studied. Based on initial parameters such as the geographic coordinates of centers, information potential of the region and costs of construction and operation of data transmission channels, the basic decisions as to placement of data centers and the number and types of interconnecting lines are made. Several possible models of interconnection of computer centers in the European (USSR) are illustrated. The complex of models developed was used to plan a configuration for connecting the hypothetical network of computer centers covering the entire country. Operation of the models showed that they could be run on an MIR-2 computer for networks of up to 60-80 computer centers. Figures 5; references 4: 3 Russian, 1 Western.

USSR

## BASIC TRENDS IN THE OPTIMIZATION OF TERRITORIAL-PRODUCTION SYSTEMS

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR, SERIYA OBSHCHESTVENNYKH NAUK issue 2 No 6, 1977 pp 79-85

AGANBEGYAN, A. G., and GRANBERG, A. G., USSR

[Abstract] Problems of increasing the efficiency of transportation and the placement of production facilities form a traditional area of research for economists and geographers. In the USSR, this area has become the first object of practical application of methods of mathematical-economical simulation on a statewide scale. Studies have been developed in parallel on the construction of national and regional economic models for plan calculations (inter-branch balances). Because of the inherent contradictions in inter-branch balance models, in that solutions optimal for one branch were often detrimental to the economy as a whole, beginning in the 1960's the idea of systems modeling of the entire economy began to be developed intensively. In this method, individual or territorial production facilities (subsystems) are combined to form a system of models in which the input and output of the models are interconnected by direct and feedback connections. Although each model included in the system can and should be used independently as a tool for analysis, prediction and planning, the conclusions produced as a result of these studies are not final, but rather must be coordinated with the overall economy model. Two specific features of this system of models are the gradually increasing scale of geographic factors as we move from the upper level of the system to lower levels and the consideration of the influence of territorial factors on the formation of general trends of development of the national economy. A block diagram is presented, showing the interconnections of the various models utilized to optimize an inter-regional, inter-branch high-level model, and each element is briefly described. In recent years, studies dedicated to the optimization of branch systems have been qualitatively changed: a transition is being made from optimization of individual branches to optimization of multibranch complexes, closely related to the development of the idea of program-goal planning, differentiation of large subsystems in the hierarchical structure of the economy to support the realization of the most important national economic goals. Examples include fuel-energy and agrarian-industrial complexes. At present, the largest scale of development of simulation actually achieved is the modeling of territorial production complexes, and the area in which these models have been most extensively used is Siberia, an area which is very interesting from the standpoint of modeling because of the strong influence of geographic and climatic factors, combined with the weaker influence of the inertia of traditional economic practices so strongly felt in areas of the USSR which have been economically developed for a long period of time. A fragment of a Program Evaluation and Review Technique-type network graph of the creation and functioning of the Boguchansk territorial production complex, including the rail system, electric power transmission and production, forestry enterprises and industrial enterprises utilizing wood as the primary raw material, is presented. Figures 4; references 11 (Russian).

## F. Economic Control at Local Levels

USSR

TEN-STORY BUILDING FOR INSTITUTE WITH COMPUTER CENTER

Moscow EKONOMICHESKAYA GAZETA in Russian ["The Electronic Center of Tadzhikistan"] No 14, Apr 77 p 24

[Abstract] Dushanbe's first 10-story building has been completed and is ready for occupancy by the Scientific-Research Institute of Economics and Economic-Mathematical Methods of Planning, and by the Computer Center, Gosplan Tadzhik SSR. The main machine room has an area of 600 square meters and is equipped with computers capable of performing more than 20,000 diverse operations per second.

USSR UDC 658.5.011

MODEL OF GROUPING ENTERPRISES FOR SERVICING AT REGIONAL COMPUTER CENTERS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 3, May/Jun 77 pp 3-8 manuscript received 10 May 76

MATSEVKO, NATALIYA SVYATO SLAVOVNA, junior research worker, L'vov Branch of Institute of Economics, Ukrainian SSR Academy of Sciences, L'vov and NUDEL'MAN, MIKHAIL SHLEMOVICH, candidate in economic science, L'vov Branch of Institute of Economics, Ukrainian SSR Academy of Sciences

[Abstract] A model is proposed for clustering enterprises in a territorial region in which several computer centers are located, each serving an individual enterprise, so that all enterprises are serviced by regional computer centers. A vector space is constructed of the initial parameters of each enterprise. Competing estimates of enterprise proximity to given computer centers and the services most economically provided by given computer centers for particular enterprises are the material on which grouping is conducted. Optimum grouping of enterprises amounts to finding the optimum number of enterprise classes, and in allocating these classes to computer centers so that more services are provided most expeditiously to the enterprises whose computer needs best match the availability of computer centers. Figure 1; references 2 (Russian).

USSR UDC 622.44:622.489

# SUBSYSTEM FOR MONITORING AND CONTROLLING COAL MINE VENTILATION

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 1, Jan/Feb 77 pp 135-138 manuscript received 30 Mar 76

FELD'MAN, LEV PETROVICH, candidate in technical sciences, Donetsk Polytechnical Institute, Donetsk, SVYATNYY, VLADIMIR ANATOL'YEVICH, candidate in technical sciences, Donetsk Polytechnical Institute, Donetsk, LAPKO, VLADIMIR VASIL'YEVICH, candidate in technical sciences, Donetsk Polytechnical Institute, Donetsk, KLEPIKOV, BORIS ALEKSANDROVICH, candidate in technical sciences, Makeyevka, DRANNYY, VLADIMIR ALEKSEYEVICH, assistant, Donetsk Polytechnical Institute, Donetsk, IVANOV, ALEKSANDR YUR'YEVICH, engineer, Donetsk Polytechnical Institute Computing Center, Donetsk, and FEDYAYEV, OLEG IVANOVICH, graduate student, Donetsk Polytechnical Institute, Donetsk

[Abstract] The ventilation system for a coal mine consists of ventilators and a network of mine workings which are considerably isolated. In addition, the position of longwalls changes constantly. In view of this, operational monitoring of ventilation conditions in a coal mine can only be accomplished by means of automated monitoring systems designed on the basis of remote measurement systems and computer technology. A mine ventilation system must be controlled constantly because work sites in the mine move and contours change and natural factors have to be estimated on a probability basis, all of which changes ventilation conditions. Because ventilation condition characteristics are of a random nature and instantaneous readings do not make possible judgements on the state of specific workings, and, thus, effective control, the best thing to do is to use an operations-supervision control system in the "adviser" mode which operates in conjunction with and compatibly with a subsystem for automated monitoring. In this paper a description is given of the hardware and software of a ventilation monitoring subsystem which solves the problem of preparing data for supervisory control of air distribution. A brief description is given of the algorithms and programs employed, and an evaluation of the subsystem is made on the basis of results of industrial tests run in the context of an ASUTP [automated management system for technological processes] for a mine equipped with an M1010 ASVT-D control computer complex. A block diagram is shown for the subsystem for monitoring and controlling ventilation (ATMOS) which is part of the overall ASUTP. The ATMOS subsystem consists of underground equipment, communications channels, and surface equipment. Meters register methane concentration and air flow. A telephone cable connects underground and surface equipment. The surface equipment consists of a control point display and control system, an SPT-3I data entry unit and an M1010 ASVT-D control computer complex. Functions of the subsystem are listed, showing the many ways in which it utilizes data on methane concentration and air distribution. The software for the subsystem is described and a flowchart of the software system programs for the ATMOS subsystem is shown. A formula is given for calculating the r.m.s. deviation from mean values of methane concentration and airflow rate from the start of the current 24-hour period. The principles underlying this subsystem were tested at the "Molodogvardeyskaya" [Young Guard] Mine of the Krasnodonugol' Combine in 1975. Two subsystems are now in operation at this mine. The ATMOS subsystem is now in the industrial testing stage. Figures 2; references 1 (Russian).

USSR

UDC 622:658.011.012

# INFORMATION-REFERENCE SYSTEMS IN AN AUTOMATED MANAGEMENT SYSTEM FOR OPEN CAST WORKING ENTERPRISES UTILIZING VOCODERS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 1, Jan/Feb 77 pp 138-141 manuscript received 18 Jul 75; after completion 20 May 76

BEREZANSKIY, ROSTISLAV TROFIMOVICH, senior scientific associate, KPI [Kiev Polytechnical Institute], Kiev, ZAKHARCHENKO, GARIY FEDOROVICH, senior scientific associate, KPI, Kiev, KULYA, VIKTOR IVANOVICH, dr in technical sciences, KPI, Kiev, and TURENKO, ALEKSANDR NIKOLAYEVICH, candidate in technical sciences, KPI, Kiev

[Abstract] Much surplus information circulates in supervisory control systems and this information is registered and processed manually. A time study of the control service at the Morozovskiy open-cast mine of the Aleksandriyaugol' Production Association demonstrated that more than 30 percent of the controller's time was spent on receiving and sending information by telephone. Almost as much time was spent on recording, processing, analyzing and filtering out useful information. No more than 50 percent of the total information received by the controller was used. To increase the efficiency of the operations control service studies have been made on creating ASODU's [automated systems for operations-supervision management] for use at open cast mining enterprises. An important component of an ASODU is the ASIS [automated information-reference system], whose main job is to free the controller from the labor-intensive work of responding to requests on the state of controlled systems and of sending messages to operations management personnel regarding deviations from prescribed functioning. Vocoders have been proven a promising component of ASIS's in that they enable messages to be sent to control personnel without interrupting the working process and that simple standard equipment, such as loudspeakers and telephone sets, is used. An ASODU which employs an ASIS which utilizes vocoders is now under development at the Morozovskiy open-cast mine. This system employs two M6000 processors and an ASVT computer complex. A description is given of the voice recording process and of the structure of the dictionaries which can be compiled. The dictionary for the system described here is compiled from individual words. Two variations of ways to enter a request into the computer are suggested, one for a great number of users utilizing an automatic telephone exchange, and the other for a small number of users, utilizing a button-type dialing system. A flowchart is given for the algorithm for forming an answer to an incoming request (or for creating a message for a signal representing deviation in the controlled process) and for reading this answer (or message) out of the computer. A vocoder has been developed at the Kiev Polytechnical Institute in conjunction with NIIRadio [Scientific Research Institute of Radio Engineering] which can be hooked up via a standard input-output link with a 2K capacity to the M6000 processor. An automatic system for outputting information by telephone utilizing this vocoder has been developed and tested, with good results. Information is transmitted by telephone with a high degree of intelligibility. This vocoder has proven highly suitable for ASIS's which are a component of an ASODU for open-cast mining enterprises. Figures 3; references 5: 4 Russian, 1 Western.

USSR UDC 658.012.011.56

# THE FIRST SECTION OF THE AUTOMATED MANAGEMENT SYSTEM (ASU) GOES ON STREAM

Moscow MASHINOSTROITEL' in Russian No 2, 1977 pp 37-39

BROVTSEV, V. A. and SYABRO, S. V.

[Abstract] The Voroshilovgrad Locomotive Plant (VTZ) imeni 'October Revolution is the largest enterprise in the country for the production of main line locomotives. The products produced at this plant are complex, made of many elements, with production cycles of varying length, which results in a variety of interconnections between production subdivisions, the presence of extensive streams of service and administrative information, complicating the administration of production and the economics of the plant. Under these conditions, the use of old methods of administration cannot provide for timely processing of needed information even if the administrative department is enlarged. Therefore, at the beginning of the ninth Five-Year plan, the plant began the creation of an ASUP [automated management system for production] based on the use of electronic computers and mathematical-economics methods, which utilizes the experience accumulated in the course of operation of the plant machine accounting station. During this time, the computer center was reorganized as a department of the ASU-IVTs [Information-Computer Center], equipped with two Minsk-32 electronic computers, equipment for data preparation and reproduction of documentation, and supplied with specialists capable of servicing and operating the equipment. Development and introduction of the first phase of the ASU-VTZ was undertaken in cooperation with PTImash [? Planning and Design Technological Institute of Machinery Manufacture] of Voroshilovgrad, the development of the unified calender planning system for production and for the supply of materials and equipment for the forging and pressing shop--with the cooperation of the Voroshilovgrad Machine Building Institute. In December of 1975, a state commission approved the initial ASU-VTZ complex, intended to perform 60 jobs in 6 functional subsystems. Principal attention was given to operational management of the production stream, the supply of materials and equipment, technical preparation of production, technical-economic planning and bookkeeping. The subsystem for operational management of production includes 13 tasks related to reception of parts and subunits from shop producers. Plan information, norms and reference information and administrative information all enter the information computer center along with operational information from the primary production shop, and the computer outputs the results of calculation as feedback to the primary production shop and information for the plant administration. Further development of this subsystem calls for improvement of operational planning among shops, development and introduction of intrashop planning and accounting using edge-punch cards for collection and transmission of information. The initial ASU complex also accounts for the movement of materials at warehouses and utilization of operating funds. The two computers have been modernized, teletype communication has been set up between the ASU-IVTs department and the shops, RP-100 production recorders have been installed at the storage areas in the plant, and a M-5000D puncher-computer complex with magnetic disc memory has been set up in the bookkeeping department. The ASU-IVTs department has a complex of electrographic equipment

(REM 420, REM 300, "Vega," "Era"). Work is underway on the introduction of equipment to mate a Minsk-1560 for direct input of information from the teletype to the Minsk-32 computer. The use of hardware in planning and accounting of primary production has led to a significant increase in the productivity of labor in the area of processing of administrative information. The economic effect achieved from the introduction of the first section of the plant ASU is 1.076 million rubles. Figures 3.

USSR

INTEGRATED SYSTEM OF QUALITY CONTROL MEANS HIGH PRODUCT QUALITY

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 2, Feb 77 pp 7-11

SARAYEV, A., Deputy General Director for Quality

[Abstract] Better quality characteristics of products made at the enterprises under the Minsk "Gorizont" [Horizon] Production Association were achieved, as a first step, by adoption of the Saratov system of zero-defect product manufacturing. Rigorous accounting of the quality of work done by workers now relied on the percentage of products passed by the quality control department the first time around. In the first year 205,000 rubles in savings were recorded due to this zero-defect product manufacturing [SBT] system. Next to be added was the combined system for quality control [KSUK]. It is grounded on these subsystems: data acquisition and analysis of product quality; control; defect-free labor; and management actions. Since at first the KSUK had nothing to do with the planning of gains in product quality or bringing in and complying with state standards, recommendations from USSR Gosstandart led to more than 30 enterprise standards under 19 quality control programs being introduced in early 1976. Thirty more standards are to follow. For swifter summary reports, a refined form of quality control was called for: the automated system of evaluating labor quality [ASOKT]. Primary in the system is the automated processing of data on control of execution and a quantitative evaluation of the quality of work done in all subdivisions of the production association. At the same time the ASOKT was launched, automated processing of reject claims began. In all, the systems approach to management in the Association brought a steady rise in the percentage of products bearing the Emblem of Quality: from 35 percent of products in 1973 to 100 percent, in July 1976. The culminating stage in quality control was the integrated system of quality control [ISUK]. ISUK embraces these systems: organization of ideological-political education and socialist competition; control of product quality based on standardization, computer-aided; and control of quality of work done, also computer-aided. Figures 4.

USSR

WITH THE ASSISTANCE OF ELECTRONICS

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 2, Feb 77 pp 12-14

KOSOBUTSKIY, B., chief technologist

[Abstract] An inseparable part of the combined system for production quality control [KSUKP] in the Minsk "Gorizont" [Horizon] Production Association is a system for production quality relying on process line methods. It has five subsystems; a subsystem for quality of process documentation and instrumentation; for control of process line discipline; for control schedules; and for regulation of the quality of industrial processes. Ongoing assistance comes by way of contracts or scientific-engineering cooperation with scientific organiizations in Moscow, Leningrad, Riga, Kiev, Omsk, L'vov, Chelyabinsk as well as with Higher Educational Institutions of Belorussia and institutes of the Belorussian SSR Academy of Sciences. The year 1975 saw these processes accepted: perforation of openings in printed-circuit boards with partial metallizing using foil; reproduction-resistant photopolymeric stencil forms for printed-circuit boards, with the simultaneous development of the chemical composition of the cement and technology of cementing molds containing circuit boards. More than 28,000 rubles in savings came from these innovations. A contract for long-term scientific-engineering cooperation was signed February 1974 between the association and the Institute of Technical Cybernetics, Belorussian SSR Academy of Sciences. A coordinating plan was developed for setting up and introducing, in the 1976-1980 period, a system for the automated designing and fabrication of process instrumentation using a complex of technical means. Its basis is to be an automated system for technological preparation for manufacturing [ASTPP] and computer-aided designing of industrial processes, routes and norms for consumption of materials. Figures 4.

USSR UDC 658.012.011.56:669

ORGANIZING THE MULTIPROCESSOR CONTROL OF OXYGEN CONVERTERS

Kiev MEKHANIZATSIYA I AVTOMATIZATSIYA UPRAVLENIYA in Russian No 2, Apr/May/Jun 77 pp 16-19 manuscript received after completion 15 Oct 76

YATSENKO, A. K., candidate in technical sciences, KOCHO, V. S., dr in technical sciences, and IVANENKO, A. YA.

[Abstract] The architecture of a M-6000 computer system is examined, as applied to the control of steelmaking in three large, 350-ton capacity, converters. The system has two processors and a 64K capacity page-organized operational memory. To store large files of information, a magnetic disk external memory is used; it is connected to the computer complex concentrator via a direct access channel to the memory. The main problem programs of the processors include:

a) "specifying"--calculating the optimal specifying actions for the main output parameters of the converter process
b) "estimation"--predicting output parameters
c) "control"--calculating, from measurements and estimates, the control actions in the converter run
d) "readiness"--determining, from indirect parameters, the emergency situations in tapping.
Figures 2; references 3 (Russian).

USSR UDC 65.011.56

APPLICATION OF GENERAL-PURPOSE COMPUTERS IN DIRECT CONTROL LOOP FOR AN INTERCONNECTED OBJECT

Moscow PRIBORY I UPRAVLENIYA in Russian No 3, 1977 p 1

GRIGOR'YEV, V. V. and GOLANT, A. I.

[Translation of Russian abstract] Establishing management of the absorber-drier department of a sulfuric acid production facility is an objective with interrelated variables, in the form of a sum of two components, one of which can be described by a mathematical model of the process and serves to compensate the monitored and calculated perturbations, and the other component takes account of the imprecision of the model of the sampling error, the nonlinearity of the moving parts and similar factors and it is externalized as a feedback dependent on the unbalance between the assigned and the actual values of the variables to be stabilized. A technical description is given for the industrial system and the results of introducing the control system are presented. Figures 3; table 1; references 8.


USSR UDC 65.011.56

ALGORITHMIZATION OF CONTROL OF START-UP REGIMES OF POLYMERIZATION REACTORS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, 1977 p 5

VOL'TER, B. V., et al

[Translation of Russian abstract] Control of the start-up regimes of ethylene polymerization reactors (of two types, blending and displacement) is described. A mathematical model of a reactor is proposed for the control system of these regimes: the model is capable of identifying the polymerization

process and calculating the control actions. Algorithms are constructed for the control of start-up regimes on the basis of this model. Figures 2; references 2.


USSR UDC 621.941:62-50

SYSTEM OF ADAPTIVE CONTROL OF CONDITIONS FOR PROCESSING NONRIGID PARTS OF INSTRUMENTS USED IN PRECISION MECHANICS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, 1977 p 45

YAMPOL'SKIY, L. S., et al

[Translation of Russian abstract] Description of three-loop system of adaptive control based on programmed regulation of the rigidity of the technological system SPID [machine tool-guiding device-cutting tool-workpiece] and the optimizing level of processing costs. All the initial data, including the law of change of rigidity as a function of the instantaneous positional coordinate of the tool and the setting for the values of the optimal parameters of the cutting conditions, are assigned by the servicing electronic computer. Results of experimental investigations. Figures 4; references 6.

USSR

IMPROVEMENT OF MODEM OPERATION IN THE "EXPRESS" SYSTEM

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ' in Russian No 2, 1977 pp 28-29

PARSHIN, V. M. and SHTEYNBOK, M. D., engineers, Moscow Railroad Computer Center

[Abstract] At the Moscow Railroad Computing Center, experience has accumulated on the operation of the "Express" system of seat reservation and sale of railroad tickets, in particular its modulator-demodulator (modem). In the system a request for information enters the data transfer equipment, then the modem [modulator-demodulator], and proceeds along the communications channel to the receiving part of the modem, the data transfer equipment and the computer. The reply from the computer travels the reverse path. The task of the modem is to transform data for transmission over the communications channel. To improve the characteristics of the modem the modulator circuit was improved and a simpler circuit which eliminates two switches was used in the commutation and control unit. After the modifications were introduced the number of equipment breakdowns because of modem failure was considerably reduced. Figures 3.

HUNGARY

A MULTI-MICROPROCESSOR ORIENTED FREIGHT-CAR FOLLOWER SYSTEM FOR THE TECHNOLOGICAL OPERATIONS OF A HUMP YARD

Budapest INFORMACIO ELEKTRONIKA in Hungarian Vol 12 No 2, 1977 pp 76-83

HAZAY, CSABA, deputy department head, Computer Technology Coordination Institute

[Abstract] The MAV [Hungarian State Railways] hump yard system employs a multi-microprocessor based system to handle its hump-yard operations, which involve $2x10^5$ characters per day to be processed (2,000 freight cars with 100 character record for each). The so-called MAV-51 system, developed by the Computer Technology Coordination Institute, is based on manual input and paper-peripheral devices. An 80 character-position printer records the operator commands and the error messages. The data messages from the incoming and outgoing trains are processed through perforated-tape peripheral units. Most peripheral devices used are from the ESER [Unified Computer System] family; they are interfaced to the central processor through the unified ESER "small interface." This article describes the central processor, the CPU [central processor unit] module, the ROM Read-only memory]/RAM [random Access Memory] module, the RAM module, the CONSOLE module, the small interface, the disk interface module, the keyboard/display unit, and the bus-to-bus connection, which are the main parts of the system. The monitors and handlers of the software are briefly discussed. The system operates efficiently. Figures 10; references 4: 1 Hungarian, 3 Western.

HUNGARY

## COMPUTERIZED PRODUCTION MANAGEMENT SYSTEM FOR CONSTRUCTION ENTERPRISES

Budapest INFORMACIO ELEKTRONIKA in Hungarian Vol 12 No 2, 1977 pp 99-107

ALMASY, GEZA, department head, Central-Hungarian Utility and Underground Construction Enterprise

[Abstract] The system described in general terms may be introduced without major expenditure and requires relatively few data from the enterprise using it. The algorithm is of the "source-limited programming type;" after entering all data, it computes the total resources required from the enterprise, prints out the result tables, and then repeats the computation, disregarding the source limitations (performs a time-limited programming operation). Once the program is approved, the system develops the work schedule for the individual operations, and ongoing information is supplied about the personnel, machinery, and material requirements, so that contracts for their supply may be issued. A feedback system is operational so that changes can be implemented when needed and on time. Measures to meet the deadline after certain interruptions or delays are established, or new deadlines are proposed for continued operation without such measures. Priorities are established and the required sequence of the various operations is laid down. The program system, the various output tables, and the economic aspects of the system are discussed. In economic terms, the system has the potential of realizing major savings and significantly increasing productivity. Figures 2.

USSR UDC 69.003:681.3.01:658.012.011

CONDITIONS OF PREFERENCE FOR DECENTRALIZED STRUCTURES OF A TECHNICAL FACILITIES COMPLEX FOR DATA PROCESSING IN THE AUTOMATED MANAGEMENT SYSTEM OF A CONSTRUCTION ORGANIZATION

Kiev MEKHANIZATSIYA I AVTOMATIZATSIYA UPRAVLENIYA in Russian No 2, Apr/May/Jun 77 pp 30-36 manuscript received after completion, 30 Apr 76

KUL'CHITSKAYA, YE. G. and RYZHOV, V. D., engineers

[Abstract] Excessive decentralization of structures in a technical facilities complex [KTS] for data processing in the automatic management system [ACS] of a housebuilding combine type of construction organization (along with other types) was investigated. Two configurations of the KTS are examined: centralized (with data processed in one processing center) and decentralized (satellite). In the latter configuration, processing occurs both in the main computer center and in satellite centers. Choice of a particular configuration hinges on the ratios between parameter values characterizing the data processing facilities, structure of the construction organization, its distribution of information flows and so on. A mathematical treatment of the configurations is given. Figure 1; references 5 (Russian).

USSR

COMPETITION ANNOUNCED FOR AUTOMATED CONSTRUCTION MANAGEMENT SYSTEMS

Moscow EKONOMICHESKAYA GAZETA in Russian ["Competition-Review of ASU's] No 16, Apr 77 p 16

[Abstract] An All-Union Competition-Review for the best automated management systems introduced in construction work has been announced by Gosstroy USSR [State Committee of the Council of Ministers, USSR, for Construction] and the Central Board of Directors of the Scientific-Technical Society of the Construction Industry. Certificates and cash prizes have been established for the winners.

USSR UDC 681.327.8

# CALCULATION OF THE PROBABILITY OF CONNECTEDNESS OF A NETWORK OF COMPUTERS BY THE METHOD OF ORTHOGONALIZATION

Leningrad PRIBOROSTROYENIYE in Russian No 1, 1977 pp 70-75 manuscript received 22 Apr 76

TOZIK, V. T., Leningrad Agricultural Institute

[Abstract] A probabilistic logic method is suggested for calculating the probability of connectedness of a network of computers, based on an effective procedure for orthogonalization of the structural function of the network utilizing the algebra of cubic complexes. The computer network is represented by a model in the form of a graph in which the junctions correspond to switching units and computers, and the lines--to communication lines. The graph of the network can be in only one of two states: connected (there is at least one simple circuit between each pair of junctions on the graph) or unconnected (at least one pair of junctions of the graph has no simple circuit connecting it). An example is presented of determination of the probability of connectedness of a pair of junctions on a graph on the assumption that the only failures in the system occur in the communication lines, represented by the lines on the graph. The paper was recommended by the Department of Economic Cybernetics, Leningrad Agricultural Institute. References 3.

BULGARIA UDC 65.011.56.681.3.06+001.57.63

# USE OF THE DISC OPERATIONAL SYSTEM OF THE UNIFIED SYSTEM OF COMPUTERS FOR AUTOMATED SIMULATION OF ECONOMIC MODELS IN AGRICULTURE

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Mar/Apr 77 pp 44-48
manuscript received 10 Mar 76; after completion 7 Sep 76

NIKOLOV, NIKOLAY BORISOV, candidate in technical sciences, NIEOUSKh [expansion unknown], Sofia

[Abstract] A discussion of the use of computers in agriculture in Bulgaria. At the present time, computers are primarily used for bookkeeping purposes there; the author calls for the use of computers for problems of optimization of the economic aspect of agriculture in Bulgaria. Economic models of the administration of organizations are described and classified in three main groups: models of prediction and planning of the activity of an enterprise; operational management models; and models for economic analysis of the activity of an enterprise. The application of the DOS of the unified system of computers to support economic models by providing the required primary information is described. The plan of action described calls for organization of a data bank, to be used throughout the year by all agricultural organizations in the country, with only three types of primary documents for the input of variable data and specific data characteristic of each specific client of an agricultural enterprise. Organization of the data bank to be used to automate the process of repeated solution of the optimization problem involved is described. The plan calls for the use of a magnetic disc system and the REGIONAL option, with the data bank on a single disc pack.

USSR

UDC 681.3:338.912.12

# RESULTS OF DEVELOPING AND PUTTING INTO OPERATION THE FIRST PHASE OF THE INDUSTRIAL AUTOMATED MANAGEMENT SYSTEM FOR THE UKRAINIAN FOOD INDUSTRY AND PROSPECTS FOR DEVELOPMENT OF THIS SYSTEM

Kiev MEKHANIZATSIYA I AVTOMATIZATSIYA UPRAVLENIYA in Russian No 6, 1976 pp 38-41 manuscript received 20 May 76

DMITRASH, V. V. and LITVITSKIY, G. F., engineers

[Abstract] The "OASU-Ukrpishcheprom" [Industrial Automated Management System for the Ukrainian Food Industry] consists of nine subsystems solving 138 daily, weekly, monthly, quarterly, and annual problems of planning, accounting, and analysis of the economic activity of the industry. These subsystems are: "Technical-Economic Planning and Analysis of Economic Activity," "Operations Management," "Control of Supplies of Materials and Equipment," "Control of Receipt of Raw Materials," "Market Control," "Bookkeeping and Analysis of Economic Activity," "Control of Financial Activity," "Planning, Accounting, and Analysis of Labor and Wages," and "Personnel Planning, Accounting, and Analysis." The system was designed to conform with the existing structure and functions of industrial subdivisions of the Ukrainian SSR Ministry of the Food Industry. Data terminals at enterprises and production associations are hooked up to oblast information-control points (OIDP's). These OIDP's are informatively and administratively connected with the Base (Vinnitsa) and informatively with the Main (Kiev) Information and Computing Center. Data sent in from enterprises to the ministry's computing centers are processed and distributed in document form, either by mail or messenger. Data are sent to these computing centers via the OIDP's through telegraph lines. One of the main yardsticks of successful fulfillment of an industry's functions is the degree to which it fulfills its production quotas. Systematized operations management can ensure success in this area by supervision of production and analysis of the current status of the quota-fulfilling process. The efficiency with which the OASU solves problems of an operations management nature depends on the speed with which raw data are fed through telegraph lines to be processed. About 900 forms of input documentation containing raw data for solving problems arrive at computing centers from enterprises. The volume of data which can be stored on magnetic tape, punched cards, and punched tape is 30 million characters. The software for the first phase of this OASU is oriented toward the "Minsk-32" and "Minsk-22M" computers. A YeS-1020 computer was put into operation in the first quarter of 1976, in preparation for development of the second phase of this system. Further development will be oriented heavily toward increasing the number of optimization and forecasting problems which can be solved with this system. It is recommended that a special-purpose organization, such as a special design bureau or institute, be created to handle research and design operations for creating all automated management systems in the Ukrainian SSR's food industry. A list is given of factors influencing the effectiveness of any automated management system.

USSR

COMPUTERIZATION OF FEED RATIONS AND MILK YIELDS

Moscow SEL'SKAYA ZHIZN' in Russian ("Feed, milk yield, electronic computer") 2 Jun 77 p 2

UPENIYEKS, A., chief, Main Administration of Animal Husbandry, Ministry of Agriculture, Latvian SSR, and ARKHIPOV, N., director, Information and Computing Center, Candidate in Economical Sciences

[Abstract] By the end of the Five Year Plan, the kolkhoses and sovkhozes of Latvia must increase their production of meat, as compared with 1975, by 28 percent, milk by 19 percent and eggs by 28 percent. To fulfill this task, the Republic should make all possible efforts to fortify its feed base. Formerly, the rations for cattle were prepared in Latvia on the basis of five indices, representing the amount of feed units, i.e., the content of protein, calcium, phosphorus and carotene. Under present conditions, in order to ensure a further increase in productivity of farm animals, it has been decided to feed cattle and hogs according to 20-25 indices. This labor-consuming work, which was formerly performed manually, is now done with the use of electronic computers. Workers of the Information and Computer Center of the Ministry of Agriculture of the Republic, together with scientists of the Agricultural Academy, created an automated system for the preparation of optimum rations. Analyses of the chemical composition and appraisals of the nutritional value of feeds are performed in the zonal agrochemical laboratory of the Republic Scientific-Research Institute of Agriculture and Agricultural Economics. The time for preparation of the starting information necessary for computerized calculation, which is provided by a zootechnician of the given farm, does not exceed 15-20 min. A calculation is made for each group of animals and includes 3-6 variants of rations. The time of calculation of one variant is 30 sec to 1 min. The cost of calculation for one group of animals of the farm averages 5 rubles. In all, the Information and Computing Center devised optimum rations for 4,500 various age-groups of cattle and hogs. The article quotes the first practical results of this scheme. Thus, in Bausskiy Rayon, kolkhozes and sovkhozes, in 1976, fulfilled the production plan of milk by 105 percent and that of meat by 103 percent. The yearly milk yield per cow increased from 2,969 to 3,126 kg. In the "Druva" kolkhoz of Saldusskiy Rayon, the milk yield per cow was increased from 3,772 to 4,068 kg. The various deficiencies in the content of minerals and organic substances in feed rations and means to alleviate them are also discussed by the authors.

USSR

## LENINGRADSKIY RAYON COMPUTING CENTER PROPOSED

Moscow MOSKOVSKAYA PRAVDA in Russian ("Rayon Computing Center") 4 Feb 77 p 2

SIGUNOV, S., chairman, Coordinating Council On Use of Computers in Leningradskiy RK [rayon committee] of the CPSU, and candidate in engineering science

[Text] Today it is hardly necessary to persuade scientists, engineers or designers to use modern computers. The "electronic brain," capable of tens of thousands of operations per minute, has become an indispensable participant in their everyday work. However, machine time is expensive, and it must be used fully, loading the equipment to full capacity. How can computer use efficiency be increased?

Specific work in this area has been done in the Leningradskiy rayon of the capital. Here specialists analyzed how computers are used in design organizations. Results showed that major departments are using the computer in the region of 50 percent. At the same time, 75 percent of the organizations have no computer at all. It was decided to correct this situation.

We began by establishing at the Leningradskiy RK of the CPSU a coordinating council on use of computers, which is made up of specialists from leading rayon design organizations. The primary task of the council is systematic control over introduction of computers into the practical work of scientists and designers and development and propaganda of recommendations for increasing efficiency of computer use.

In all organizations, those responsible for use of computing equipment have already been chosen. They make up the aktiv of the council and implement the projected steps. Much has already been done. An index which takes into account the level of automation in designing has been introduced into the conditions for rayon socialist competition. A reference information bank has been prepared which permits those organizations without a computer to immediately solve the question of performing individual design operations with the use of computing centers (VTs) of other organizations.

However, the tendency of establishing independent narrowly specialized subelements equipped with a computer remains. After all, using a computer even by mutual agreement has a number of shortcomings. Because each design organization plans the work of the subelements equipped with a computer, at its discretion, in an individual plan. It is also evident that if the 75 percent of the design organizations without computers acquire them, the use of this equipment will in time be reduced in the best case to the existing level--50 percent.

These shortcomings can be overcome, after establishing a territorial computing center for collective use. Favoring its organization in the Leningradskiy Rayon are these figures. The material-technical base of the collective VTs (based on the proposed level of automation for 1977-1980) amounts to 4 million rubles instead of the 10 million rubles which would be needed for individual equipping with computers of those design organizations without them.

A number of questions of principle must be solved in setting up a center for collective use. And chief among them is determining its organizational and functional structure. It is envisaged in the form of production-

methodological centers for solving the basic questions of automation of the labor of the scientists and designers.

In the near future, the collective use VTs should ensure the performance of 70-80 percent of all planning operations, while learning the functions of the customers for preparation and output of initial information on each new object, determining the style of its performance and selection of the final version.

USSR

UDC 651.926:681.3.004.14

# THE STRUCTURE OF CURRENT MACHINE TRANSLATION SYSTEMS

Moscow NAUCHNO-TEKHNICHESKAYA INFORMATSIYA, SERIYA 1 in Russian No 4, 1977 pp 12-15 manuscript received 20 Jul 76

MARCHUK, YU. N.

[Abstract] A description is given of the various theoretical approaches used in designing machine translation systems, of the requirements for an ideal machine translation system, of the materials presently available in the USSR for machine translation from the major foreign languages into Russian, and of present problems being faced in the effort to develop a universally compatible system for successful translation of commercial and scientific texts into Russian. Emphasis is placed on the fact that no one theoretical approach, utilizing mathematical, linguistic, or various forms of interaction between mathematical and linguistic methods, has resulted in a practical machine translation system, nor has any basis been found for preferring one system to another. The two main trends in the development of machine translation are: (1) the "engineering" trend, which seeks to expand the capabilities of the computer to detect and identify word forms, scan texts for meaningful structures, and arrive at a description of the semantics of a language, and (2) the "semantic" trend, which concentrates on modeling the semantics of human use of language. It is difficult to assert at the present time that any available theory or combination will result directly in high-quality machine translation for industrial use. A combination of theories or variants of theories together with a unified strategy is necessary. Some of the problems pointed out are that state-of-the-art machine translation is strictly subject-oriented, which requires strict compatibility between dictionaries of the subject and target languages, that there has been little consistency in the development of independent systems for specific purposes, and that the software available was designed for "Minsk" or BESM-4 computers, although machine translation requires high-capacity, fast computers such as the YeS-1040, and conversion of programs is a formidable task. Also emphasized is the necessity of developing a special language for programming machine translation problems. Hope is seen in doing further studies on the participation of man in the machine translation process. Existing systems for translation into Russian all use man in the role of pre-editor, intermediate editor, and/or post-editor. Brief descriptions are given of the AMPAR and SPAR systems for translation from English into Russian, the NERPA system for German-Russian, and the Fr-2 and FRAP systems for French-Russian translation. References 12: 9 Russian, 3 Western.

USSR

UDC 651.926.004.12

# EVALUATION OF THE QUALITY OF SCIENTIFIC AND TECHNICAL TRANSLATIONS WITH REGARD TO THEIR PURPOSE

Moscow NAUCHNO-TEKHNICHESKAYA INFORMATSIYA, SERIYA 1 in Russian No 4, 1977 pp 31-34 manuscript received 21 May 76

SMIRNOV, I. P.

[Abstract] During the Ninth Five-Year Plan the volume of translations increased by a factor of 2.7 and there is now a strong tendency to increase this volume even further. The major requirements for a scientific or technical translation are the same as those for any scientific or technical document--timely presentation and high quality. Scientists have been demanding translation of foreign literature at an ever faster rate. The All-Union Center for Translations of Scientific and Technical Literature and Documents of the State Committee of the Council of Ministers, USSR on Science and Technology has drawn up a schedule of deadlines for non-staff personnel for translation from and into various categories of languages. Further efforts are being made to reduce the time spent on translation of scientific and technical material. The quality of translations is not always good, partly because of increasingly shorter deadlines, which make it difficult for the translator to consult reference materials and to take the time to check terminology. All too often the quality of translations is judged subjectively, because of the lack of objective criteria. A method for evaluating quality is given here. The purpose of any translation is defined as that of the original material: To convey information. Quality can be judged at four levels of the deep structure of language: Semantic, grammatical, lexical, and stylistic. The quality of any translation is the sum of the quality of that translation at each of these four levels. As far as scientific and technical translation is concerned, an additional factor must be taken into account. The text can be understood at two levels: Linguistic and extralinguistic. Linguistic understanding of the text is judged by the degree to which the textual information in the original is fully reflected in the translation. Extralinguistic understanding of the text is reflected in evidence of additional knowledge of the subject matter which enables precise translation of the original but not specifically imparted by the original. Complete translation can thus be regarded as the sum of basic textual information contained in the original and of additional information imparted by the expertise of the translator. As documents translations can be divided into two main types: For publication and not for publication. Translations not for publication are further subdivided into: Working drafts, translations requiring editing, and edited translations. A correlation is made between this system of categorization and the specific deep structure levels which each category should be evaluated at. For example, as a bare minimum any translation should be correct at the semantic level (working draft) and an edited translation or a translation for publication must be correct at all levels, including that of format. It is hoped that this objective system of evaluating translations will make it possible to establish a more proper relationship between translator or translating agency and the client. Figure 1; tables 4; references 4 (Russian).

USSR

INTRODUCTION OF ROBOTS IN USSR INDUSTRY ADVOCATED

Moscow TEKHNIKA I NAUKA in Russian ["How Does A Robot Live?"] No 2, 88 pp 8-11

YEVSEYEV, YE., Special Correspondent of TEKHNIKA I NAUKA

[Abstract] In the 10th Five-Year Plan, the 25th CPSU Congress envisages the acceleration of the complex mechanization and automation of production processes as one of the most important tasks for the national economy. The programs conducted in the present Five-Year plan include a comprehensive program for the creation and production of industrial robots. The considerable expansion of their series production and the development of approximately 20 new types of robots for various purposes, including welding, painting and servicing metal-cutting machine tools, casting machines and presses is being planned. The creation and production, already in the present Five-Year plan, of industrial robots with adaptive controls will make it possible to reduce the outlays for the preparation of the production and organization of operators' positions by 25-30 percent, and will increase labor productivity 1.3-1.5 times. In the realization of this program, the USSR Academy of Sciences actively participates: a special scientific council on the theory and principles of robot design has been created by the Department of Mechanics and Control Processes. Its part includes the coordination of the efforts of many scientific research and academic institutes, higher educational institutions, and design bureaus, which take part in the solution of problems concerning robot technology. It is estimated that realization of robotization of industry will permit a more rapid and successful fulfillment of the Five-Year plan, and will liberate over 2.5 million workers from manual labor. Figures 3.

USSR

ROBOTS SERVING MAN

Riga SOVETSKAYA LATVIYA in Russian 23 Feb 77 p 4

YAMPOL'SKAYA, NEONILA, "Novosti" Press Agency

[Abstract] In Leningrad at the Polytechnic Institute imeni M. I. Kalinin the Special Design Office of Technical Cybernetics functions as the main organization in the country working on the creation of industrial robots. Its manager and chief designer, Doctor of Technical Sciences Yevgeniy Yurevich, answered questions of the "Novosti" correspondent about the development of robot technology in the USSR. They are very widely used, he said, in science, in space and deep-sea investigations, in atomic power engineering and transportation, but especially in machine building--for assembly, welding, painting, loading, unloading, etc. It is proposed to produce a series of

both industrial and more complex robots. Dozens of types have been created. The fact that they replace workers can only be welcomed, for they perform monotonous operations which in many cases require great physical efforts, and consequently working conditions are improved. Although robots are costly, they pay for themselves in 2-3 years.

USSR UDC 681.327.11:621.397.7

INFORMATION OUTPUT OF AUTOMATED MANAGEMENT SYSTEM THROUGH FACSIMILE COMMUNICATION CHANNELS

Moscow ELEKTROSVYAZ' in Russian No 11, 1976 pp 35-38 manuscript received 23 Jan 75

BUKHVINER, V. YE., DRABKIN, R. I., MOISYEYEV, S. M., NAZAROV, V. I., and SOLOVEYCHIK, I. YE.

[Abstract] One pressing problem in planning the "Svyaz'" branch automated management system (AMS) is the development of an optimum method of delivery of facsimile copies of machine documents through electric communication lines--the method of remote documentation of data. A system of remote documentation of graphic information from the screen of a video terminal can be used in the AMS for immediate distribution of documents to scattered subscribers who have a standard facsimile apparatus. The system allows a decrease in the labor consumption for delivery of documents to remote AMS subscribers, a decrease in the hardware required in the technological documentation chain, and an increase in the speed and accuracy of delivery of documents. This is achieved by a connecting between the video terminal and the facsimile apparatus a device which converts television signals to phototelegraph signals. A flow chart of the operation of such a system is presented, plus a hardware block diagram. The system allows remote documentation of data from the display to switched telephone lines without using special modulator-demodulators (modems) and electromechanical printers, plus a significant increase in the speed of documentation, while conserving the quality characteristics of documents. Figures 4; references 4 (Russian).

USSR UDC 681.31:681.322.074

ANALYSIS OF DATA DISPLAYS FOR MINICOMPUTERS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 1, Jan/Feb 77 pp 88-94 manuscript received 5 Apr 76; after completion 18 May 76

SIGALOV, VALERIY IOSIFOVICH, candidate in technical sciences, IK AN USSR [Ukrainian SSR Academy of Sciences Institute of Cybernetics], Kiev; PALAGIN, ALEKSANDR VASIL'YEVICH, candidate in technical sciences, IK AN USSR, Kiev; BADASHIN, VADIM VITAL'YEVICH, engineer, IK AN USSR, Kiev; SASYUK, NIKOLAY MAKAROVICH, mechanic, IK AN USSR, Kiev; and DENISENKO, VYACHESLAV PLATONOVICH, candidate in technical sciences, Kiev

[Abstract] In this paper an analysis is made of the structure of data display modules (MOI's) for minicomputers. These MOI's do not operate independently but are used only with minicomputers. Data entry and documentation and the formation of an array of data to be displayed as well as editing of

these data are performed by the central processor, peripheral equipment, and software of the minicomputer, the MOI being one of the peripherals. The modular approach makes it possible to achieve various arrangements with different capabilities without the necessity of developing extra equipment. A table is shown which compares the main characteristics of an MOI developed by the Ukrainian SSR Institute of Cybernetics and those of the Hewlett Packard (USA) model 9120A, both designed for displaying data by means of a standard television receiver. Calculation formulas are also obtained which show the relationship between parameters of the MOI and those of the minicomputer to which it is hooked up and which make it possible to evaluate the work load and utilization factor of the minicomputer. An evaluation is made of different variants of the structure of an MOI by considering expenditures of machine time on behalf of the central processor for image regeneration, the speed of data output from the computer, the capacity of the buffer zone in the computer's main memory, the data capabilities of the MOI, and equipment costs for realizing MOI's. An analysis is made of the structure of an MOI designed for displaying data in positional fashion, without a regenerating memory unit, as the simplest variant with regard to equipment used. An analysis is likewise given of the structure of an MOI which displays data in coded form, with a position code generator for converting symbol codes into position codes corresponding to the lines of the symbol matrix. A description is given of the structure of an MOI with a partial-regeneration memory unit, which is considered the most promising for designing modules for displaying alphanumeric data. With but moderate equipment costs for building the MOI and a moderate amount of machine time for image regeneration, this type of structure makes it possible to obtain a data capacity for the display's screen which is sufficient for the majority of practical applications. Figures 4; table 1; references 5: 4 Russian, 1 Western.

USSR UDC 002.513.5:681:3

AN AUTOMATED DATA PROCESSING SYSTEM FOR A HIGHER EDUCATIONAL INSTITUTION

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 1, Jan/Feb 77 pp 133-135 manuscript received 30 Mar 76

LYASHKO, IVAN IVANOVICH, academician of the Ukrainian SSR Academy of Sciences, KGU [Kiev State University], Kiev, and OSTAPCHUK, VALERIY SERAFIMOVICH, candidate in physics and mathematical sciences, KGU, Kiev

[Abstract] The first phase in creating an automated management system for a higher educational institution is the creation of an AIS [automated data processing system]. These institutions are distinguished as controllable systems by the multifaceted activities engaged in by administrative and instructional personnel. The AIS is made up of a data bank; hardware for gathering, processing, and storing data; software; and service personnel. All the problems which can be solved within this context can be divided into a number of groups: Instructional, scientific, personnel-related, financial,

and administrative management. The following are the most important subsystems usually developed in the first phase: STUDENT, which keeps records of student achievements and statistical data relating to students; PREPODAVATEL' [TEACHER], which keeps records of statistical data and data relating to the instruction methods and scientific and public activities on the part of teachers and professors; ABITURIENT [Person who has completed secondary education], which keeps statistical data and the results of graduates' entrance exams; KONTROL' [SUPERVISION], which supervises fulfillment of instructions from the rectorate; ZARPLATA [SALARY], for crediting salaries; and RASPISANIYE [SCHEDULE], for automatic class scheduling. The STUDENT subsystem can be used to develop a further subsystem geared specifically, say, to processing data on the current level of achievement of students, such as the USPEVAYEMOST' [ACHIEVEMENT] subsystem. The PREPODAVATEL' subsystem can be used to develop a subsystem for keeping records of and analyzing activities in the scientific research sector, such as the DOGOVOR [CONTRACT] subsystem. In this paper a brief description is given of some subsystems of an AIS developed at Kiev State University imeni T. G. Shevchenko, which are based on use of the M-220M computer. Descriptions are given of the KONTROL', STUDENT, PREPODAVATEL', and RASPISANIYE subsystems. A mathematical description is given of the numerical basis for solving the problem of class scheduling. ABITURIENT, DOGOVOR, and USPEVAYEMOST' subsystems are in the process of development at Kiev State University and the ZARPLATA subsystem is now functioning successfully. Concern is expressed over limitations on the adaptability of the subsystems which have been developed to solve unanticipated problems which arise, and over the strictly machine-oriented nature of the programs developed. The design of processors oriented to classes of languages, i.e., parametric programming systems, is offered as a possible solution to this problem. References 3 (Russian).

USSR

MANAGEMENT. ELECTRONIC COMPUTERS. LAW

Moscow KHOZYAYSTVO I PRAVO in Russian No 1, Jan 77 pp 19-22

GLUSHKOV, V., Academician

[Abstract] One characteristic peculiarity of the development and use of electronic computer equipment is that a new branch of industry has arisen as a result of its development--the information processing industry. This branch requires a legal foundation, particularly some juridical status of the computer centers themselves and the personnel who work there. Traditionally, computer center personnel are considered administrative personnel, even though they essentially perform quite different functions. Furthermore, in spite of the fact that computer centers are actually becoming a new branch of industry, the information processing industry, they have not yet been recognized as socialist enterprises. A number of legal problems arise also in connection with the use of automated management systems (AMS). This requires restatement

of the problem of responsibility for decisions made, preparation of initial information, etc. In the preparation of complex plans for administrative decisions utilizing computers, we input tremendous quantities of information, resulting in confusion as to the actual original sources of information and responsibility for its accuracy. Information read by automatic sensors on machines is input to automatic computers which automatically generate decisions for which no human being is clearly responsible. In planning such systems, we must always be sure to record information: whence it came and how it was subsequently used in the decision making process. Errors in information files can also be introduced at the computer center itself by improper storage or careless handling of magnetic discs or tapes. These distortions, as well as failure to keep files up to date, may cause management to make decisions based on obsolete or incorrect information. This whole question of decision making requires further analysis. The responsibility of human beings for decision making must not be reduced by the introduction of AMS. Complex legal problems arise when computer equipment is shared, particularly as a part of the state network of computer centers (GSVTS) or the statewide automated system for collection and processing of information for accounting, planning and management of the national economy (OGAS). The systems are currently being created, and when they are completed, because of the interconnected nature of computer centers statewide, a tremendous problem of information security will arise. This problem will be exceptionally difficult because of the tremendous quantity of information stored in the statewide computer networks and the large numbers of users, as well as the necessity that file protection itself be automated. To handle the problem of, for example, a metallurgical plant which is not interested in providing a precise list of deliveries and adjusting its operating plans as required by these deliveries, although the customers of the metallurgical plant are so interested, a special network of highly powerful computer centers will be set up on a statewide basis, i.e., will belong to a special department involved in the business of information processing. This network of (about 200) centers will not only perform computations, but also include an information service and will have the right to enter the AMS of our hypothetical metallurgical plant and force it to perform work in the interests of its customers. The problem of double subordination also arises. The computer centers will be under both the ministry or department which they serve and under the interdepartmental information processing service; the capabilities provided by an AMS require changes in many economic mechanisms, as well as the corresponding legal documents. The new network of computer centers will intercept many detailed problems of coordination of suppliers and consumers which currently "float up" all the way to the State Planning Committee, producing decisions which are concerned with the interests of both suppliers and consumers. However, the actual plan for supply of materials and equipment will not be generated by this network of computer centers. It will work only with information, the process of preparation for decision making; the actual decision will be made by the directors of the enterprises involved. A legal mechanism is also required to redistribute profits gained by one enterprise among other enterprises which may incur losses as a result of the same supplier-consumer scheduling by the network of computer centers which produce the profits for the first enterprise. Many other problems of this sort will also arise when the new network of computer centers goes on stream.

USSR

UDC 681.3.015

# STRUCTURE OF BUFFER STORAGE AND DETERMINATION OF ITS VOLUME IN AN INFORMATION-COMPUTER NETWORK

Riga AVTOMATIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 1, Jan/Feb 77 pp 59-64 manuscript received 24 Mar 76; subsequently 23 Jun 76

BUDZINAUSKENE, YE. T., and KOPELEVICH, B. M.

[Abstract] As buffer storage (BS) is used for purposes of interaction between the computer and peripheral devices, and a special type of buffer storage is required for accumulation of incoming and outgoing messages. This storage consists of levels with clearly delineated functions, the purpose of which consists in the accumulation of fragments of messages in order to form a complete message and transmit it to the computer for processing. A fragment in this case means a certain volume of semantic information consisting of one or more bytes. The problem consists in developing a method of rational organization of this buffer storage. Determination of the volume and structure of BS requires preliminary quantitative evaluation of the messages of users. It is suggested that BS be constructed according to a two-level principle, distinguishing area $D_1$, intended for storage of incoming fragments in order to form complete messages, which are then sent to area $D_2$, where they await processing by the central processor. Both areas may be sizable if there are a significant number of users. Further depending of BS structure leads to the concept of modular structure, in which $D_1$ is divided into modules of identical length, each module being an elementary physical unit of storage consisting of several bytes, words, etc. It is this modular structure which allows the principle of dynamic distribution of storage to be realized. A method is suggested for determination of the volume of memory of two levels when the dynamic distribution of memory is utilized, involving the theory of statistical decisions. A flow chart of the process of accumulation of messages is presented, plus tables for determination of the optimal module length with Poisson and geometric distributions of message lengths. Figures 3; references 4: 3 Russian, 1 Western.

HUNGARY

COMPUTERIZED INFORMATION PROCESSING IN THE PRODUCTION MANAGEMENT OF INDUSTRIAL ENTERPRISES

Budapest INFORMACIO ELEKTRONIKA in Hungarian Vol 12 No 1, 1977 pp 25-31

LUKACSI, JOZSEF, deputy director, and KANCSAR, PETER, group leader, SZUV [expansion unknown]

[Abstract] The production management system was developed for use with IRIS-50 or FELIX type computers; however, its structure (memory requirement, peripheral device requirement, programming language) is such that it may be adapted to other computer families, including the ESER [Unified Computer System] family. This article describes the system in general (designed to be used for material supply and management, as well as for production planning and supervision in separated part systems), the methods for keeping track of orders, shipments, stocks, inventories, production needs, production status, accounting, and deadline adherence. The program packets for the two main parts of the system are combined through the development of a joint basic-data set. From this set, the material supply and management portion uses only part, while the production planning and supervision portion uses all data. The system is presently used at the Nagykanizsa Precision-Mechanical Enterprise. Introduction was a gradual and lengthy process, but the system did fulfill the expectations. Figures 3; references 4 (Western).

HUNGARY

MANYI: AUTOMATIC REGISTRATION SYSTEM FOR MAGNETIC TAPES

Budapest INFORMACIO ELEKTRONIKA in Hungarian Vol 12 No 1, 1977 pp 32-38

ALFOLDI, ISTVAN, principal referent, Computer Technology Directorate, KSH [Central Statistical Bureau]

[Abstract] The paper is concerned with the system used at the KSH for managing the stockpile of magnetic tapes in an automated manner. It may be used with IBM and ESER [Unified Computer System] computers--in some cases with modifications--which employ the OS operating system. The following functions are performed: recording, identifying, storing, and maintaining the incoming tapes; ensuring the supply of new tapes and handling the tape supply problems; preparing tape catalogs on the basis of the tape identifications in a user-oriented manner; preparation of the data carriers for upcoming uses. The system consists of an automatic and a manual part. Operation is primarily automatic; the manual part is used only for interventions if novel problems arise, e.g., if there is malfunction, if tapes are to be discarded, if tapes are to be reactivated, and so forth. In designing the system the aim was to ensure the security of data collections, dependability

of the operation of the system, and the protection of the collection of tapes. The system operates satisfactorily at the Computer Technology Directorate of the KSH. Figures 4.

HUNGARY

COMPUTERIZED RECORDING AND RETRIEVAL SYSTEM FOR LAWS AND STATE ADMINISTRATIVE FUNCTIONS

Budapest INFORMACIO ELEKTRONIKA in Hungarian Vol 12 No 2, 1977 pp 94-98

REVESZ, FERENC, dr, acting director of the State Administration Institute of the Ministry of Finance, and BARASZ, ANDRAS, group leader, Computer Technology Directorate, KSH [Central Statistical Bureau]

[Abstract] This article describes the JOG-DOK law and state administrative function storage and retrieval system recently tried out at the Ministry of Finance. The information unit contains data blocks for identifying information, textual information, analytical information, organs of jurisdiction, and areas of jurisdiction. There is also information about the agency that issued a law, the type of law, the number of the law, the reference to the full text of the law, and the promulgation or withdrawal time of the law. The subsystems comprise the host organ directory, the function directory, the keywords directory, the organ directory, the jurisdictional directory, the appeal procedure directory, and the jurisdictional area directory. The program system comprises the data-recording, data-retrieving, updating, and other auxiliary programs. The system may be upgraded to include also references to precedents and jurisprudence, and law history. The project demonstrates the feasibility of computerizing some aspects of law and state administration. Figures 2.

HUNGARY

ENTRY OF PROGRAMS AND JOBS FROM PERFORATED TAPE INTO THE DOS/ESZR SYSTEM OPERATED ON THE R-40 COMPUTER OF THE VEIKI

Budapest INFORMACIO ELEKTRONIKA in Hungarian Vol 12 No 3, 1977 pp 171-174

LUKA, IREN, scientific-technical referent, VEIKI [Electric Power Industry Research Institute]

[Abstract] This article describes briefly the PTINPUT program used to enter programs and jobs from perforated tape into the DOS/ESZR [Unified Computer System] operating system for the R-40 computer operated at the VEIKI. The key of the method used is an intelligent interface program. With the aid of the PTINPUT program, the information recorded on perforated tape is transferred into card-format records and it is transferred in the EBCDIC code to the SYSPCH logic device in such a manner that the information transmitted may subsequently be handled as a conventional system-logical (SYSIPT, SYSRDR) or program-logical (SYSnnn) file. The basic version of the program handles the five-channel TELE and TELEX codes and the eight-channel EICHNER, ISO, and ASD codes. The appendix of the tabulation may define functions with which the functions of the program may be narrowed or expanded. The capabilities of the perforated-tape data-preparing devices may be utilized fully when handling programs written in FORTRAN, PL/1, and ASSEMBLER languages. The program may only be used in the DOS operating system; it was developed for ESZR equipment. Figures 1; tables 2.

USSR

STANDARDIZED DOCUMENTATION SYSTEM FOR AUTOMATED MANAGEMENT SYSTEMS

Moscow EKONOMICHESKAYA GAZETA in Russian ["For Automated Management Systems"] No 15, Apr 77 p 15

[Text] The development and efficient functioning of ASU [automated management systems] depends to a large extent on their being well supplied with information. For this purpose the USSR Gosstandart together with the ministries and departments are creating a USD [standardized documentation system] and All-Union Classifiers for Technical-Economic Information.

At the present time 13 standardized documentation systems have already been developed. Also 20 all-union classifiers for technical-economic information have been created to provide for transfer of information among ASU of various levels in performing tasks in planning, accounting, supply of materials and equipment and management. Among these all-union classifiers are ones for industrial and agricultural production, branches of the national economy, and labor resources.

The work of creating new USD and all-union classifiers for technical-economic information is continuing. USSR Gosstandart has authorized technological normative documents, regulating their incorporation into ASU.

USSR UDC 681.3.06:51

METHODS OF MODELING MINICOMPUTER OPERATIONS AND USE OF OPEN SUBPROGRAMS

Moscow PROGRAMMIROVANIYE in Russian No 1, Feb/Mar 77 pp 68-73 manuscript received 27 Apr 76

MIKHLIN, G. Z.

[Abstract] This article is concerned with the study of several methods for modeling minicomputer commands. Special attention is paid to modeling based on the use of open subprograms using ASSEMBLER language on a computer. Practical application of the proposed method permitted examination of the questions involved both with analyzing the control algorithms to determine the necessary parameters of the minicomputer and with the possibility of a more careful debugging of the special software. An experiment was conducted in order to determine the effectiveness of this method and the experimental results are discussed. The author thanks S. S. Lavrov, corresponding member, USSR Academy of Sciences, for attention to the work and a number of important comments. Tables 2; references 10 (Russian).

USSR UDC 681.3.06

BLOCK SIMULATION OF ONE CLASS OF LOGICAL MOS INTEGRATED CIRCUITS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Mar/Apr 77 pp 100-102 manuscript received 23 Jul 76; after completion 10 Nov 76

NAZAROV, NIKOLAY IVANOVICH, junior research worker, Institute of Mathematics, Siberian Branch, USSR Academy of Sciences, Novosibirsk

[Abstract] A method is suggested for using block modeling to study the transient processes in MOS IC [integrated circuits] with arbitrary interconnection of blocks, including feedback. The MOS IC to be analyzed are represented as a logic network. Each block has inputs and outputs. Capacitive loads may be connected to some of the outputs. The inputs and outputs of the various blocks are interconnected or serve as inputs and outputs of the entire network. Networks are studied in which the inputs of all blocks are connected to the gates of transistors. The method is based on sequential integration of the equations for the blocks over rather long time intervals. The method is produced as a program to be run on the Minsk-32 computer. The program is designed to study the transient processes in complementary MOS IC with up to 250 transistors. Modeling of switching under the influence of one pulse in the network without feedback, consisting of blocks of up to 4 transistors with a total complexity of 250 transistors, would require 6-10 minutes of machine time. Machine time requirements are increased when increased accuracy is required, when the blocks are more complex and when feedback is present. Figures 4; references 6 (Russian).

USSR UDC 621.397.331.2

OPERATIONAL MATCHING OF HOLOGRAPHIC RECOGNITION SYSTEMS IN REAL TIME

Leningrad PRIBOROSTROYENIYE in Russian No 1, 1977 pp 113-116

STUYT, V. A., Moscow Higher Technical School imeni N. E. Bauman

[Translation of Russian abstract] A study is made of problems of operational matching of automatic recognition systems, utilizing the holographic method of optical three-dimensional filtration. A mathematical description is presented of the characteristics of a recognition channel. Experimental data are presented from operational matching and recognition of objects in real time.



USSR UDC 681.323

DECIDING ON THE OPERATING SPEED OF A SPECIAL-PURPOSE PROCESSOR AND ON THE NUMBER OF COMPUTERS TO BE SERVED BY IT

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 1, Jan/Feb 77 pp 86-88
manuscript received 6 Apr 76; after completion 9 Jun 76

ACHKASOV, YURIY MIKHAYLOVICH, candidate in technical sciences, NII [Scientific Research Institute] of Automatics and Electromechanics, Tomsk, KRYKIN, SERGEY SERGEYEVICH, graduate student, Institute of Automated Management Systems and Radio Electronics, Tomsk, and UKHANOV, LEONID IVANOVICH, graduate student, NII of Automatics and Electromechanics, Tomsk

[Abstract] Digital processing of research materials often involves step-by-step solution of a problem, giving rise to the necessity of making a great number of simple computations. Performing these computations with a computer takes a lot of machine time, so a faster acting device is used--the special-purpose processor. Special-purpose processors are designed for high operating speed, but they can perform only a certain proportion of an entire set of algorithms. The processor's operating speed is thus a function of the algorithm for solving a specific class of problems and the characteristics of the computers designed to operate along with it. The purpose of this paper is to derive formulas for determining the operating speed of a special-purpose processor and the number of computers which can be served by it. A computer-processor combination can solve a certain set of problems by means of a certain set of algorithms and this fact determines the characteristics of the combination. Each problem is regarded here as a strict sequence of stages, each stage reflecting the necessity of performing special computing operations involved in running through a specific algorithm. A formula is derived for the execution rate of the processor, which is inversely proportional to

the time required for solving one stage of the problem, taking into account the time required for entering and reading out data. A formula is derived for determining the total time required to solve one stage of the problem on the part of the processor, taking the number of operations necessary and the speed of the processor into account. The formula for determining execution rate (efficiency) is further refined, and a formula for determining the processor's speed is derived, taking all factors into account. To determine the speed of the special processor it is necessary to know the number of computations necessary for running through the algorithm in question, parameters which are a function of the processor's structure, and the technical characteristics of the computer working in combination with the processor. Knowing the speed of the processor and the time required to run through one stage of the problem, the number of requests the processor can handle is determined. The computing complex is regarded as a queuing system. A request entered over an interval of time less than the time required for computing a stage of the problem stands in a waiting line. Probabilistic methods are used to derive a formula for the average number of requests which can be handled by the system, and knowing this value and the number of requests entered from one computer, it is possible to determine the number of computers which can be served by a single processor with specific restrictions on the lag time of incoming requests. References 3 (Russian).

USSR UDC 51:681.3

ESTIMATE OF THE EFFECTIVENESS OF A TIME-SHARING COMPUTER SYSTEM BY MEANS OF ANALYTIC AND IMITATION SIMULATION

Kiev KIBERNETIKA in Russian No 3, May/Jun 77 pp 65-72 manuscript received 19 May 76

SOKOLOVSKIY, YURIY LEONIDOVICH, junior research worker, Institute of Cybernetics, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] One objective measure of the adequacy of an analytic model is the similarity of its results to data obtained by a simulation method which is acknowledged to be isomorphic with the system being studied. This work demonstrates a similar approach: parallel investigation of two models of a computer system--one imitation model and one analytic model--and comparison of their results. This study concerns a single-processor computer system operating in the time-sharing mode with three levels of page-turning memory. The results of the experiments indicate that: the imitation model is adequate to reflect a fragment of the system so that its results can be used to verify the output data of the analytic model; the analytic model suggested is oriented toward the typical operating mode of the computer system. Its results agree well over a broad range of initial parameters with the results of imitation modeling and can be used for approximate estimation of the expected effectiveness of the system during the initial stage of its development. The

method used may be useful in the practice of planning of computer systems because it provides reliable a priori estimates of the correctness of important plan decisions. Figures 2; tables 2; references 10: 4 Russian, 6 Western.

USSR UDC 51:65.012.122

SOME PROBLEMS OF STOCHASTIC PROGRAMMING WHICH ARISE IN DIALOGUE PLANNING SYSTEMS WITH INCOMPLETE INFORMATION

Kiev KIBERNETIKA in Russian No 3, May/Jun 77 pp 100-104 manuscript received 16 Mar 76

GLUSHKOV, VIKTOR MIKHAYLOVICH, academician, Director, Institute of Cybernetics, Ukr SSR, Academy of Sciences, and OLEYARSH, YEVGENIY ALEKSEYEVICH BORISOVICH, group supervisor, Institute of Cybernetics, Ukr SSR Academy of Sciences

[Abstract] At the present time, the Institute of Cybernetics, Ukrainian SSR Academy of Sciences is working on the creation of dialogue planning systems. The methodological principles of the design of these systems have been established. In 1975, an experimental system based on the BESM-6 electronic computer using a graphic display was used to complete the first stage of development. The "Displan" dialogue planning system developed is intended for prompt balancing of the resources of prospective plans by variation of the elements of matrices and vectors of a model. Jobs include construction of an optimum plan on the basis of the criterion of the minimum mathematical expectation of labor expenditures and determination of the optimum paln on the basis of the criterion of the minimum mathematical expectation of cost of corrections. The possibility of actually running the algorithms suggested is analyzed. References 8 (Russian).

# VII. GENERAL INFORMATION
## A. Conferences

USSR UDC 007

ALL-UNION SCHOOL OF JUNIOR SCIENTISTS AND SPECIALISTS, "THEORY OF SYSTEMS AND ITS APPLICATIONS"

Moscow AVTOMATIKA I TELEMEKHANIKA in Russian No 1, Jan 77 pp 170-173

BRUSILOVSKIY, P. M. and ROZENBERG, G. S.

[Abstract] More than 250 specialists from 10 union republics, representing 133 organizations from 43 cities, took part at the All-Union School of Junior Scientists and Specialists, "Theory of Systems and Its Application." It was held 18-26 Feb 76 at Minsk, on the initiative of the Scientific-Technical Society of Radio Engineering, Electronics and Communications imeni A. S. Popov, the Komsomol CC and the USSR Academy of Sciences. Subjects treated at the sessions included: information science, artificial intelligence, control theory and cybernetic systems, optimization of long-term planning for expansion of large-scale systems, psychology of control of man-machine systems, modeling hierarchical systems and data banks. Brief abstracts of 21 papers are presented.

USSR UDC 681.32:061.43

SUMMARY EVALUATIONS OF MAJOR MODELS OF FOREIGN COMPUTING EQUIPMENT DISPLAYED AT EXHIBITIONS

Riga AVTOMATIKA I VYCHISLITEL'NAYA TEKHNIKA in Russian No 2, 1977 pp 84-87
manuscript received 25 Oct (19 Apr) 76

GORUKHIN, V. M.

[Abstract] International exhibitions of data processing equipment from all over the world have been held in the USSR to enable specialists to evaluate available equipment and give recommendations on possible use of this equipment in existing systems. This article summarizes brief information on items of interest shown at exhibitions between 1965-1975. A point is made of the fact that IBM, because of successful competition from a number of firms in the world, can no longer be considered the undisputed leader in data processing equipment. Equipment in the following categories is discussed here: Optical scanners: Interscan's (England) Laser OCR1; the Scandata-2250; and the Opscan 17. Data-forming and primary output equipment: Texlon Corp.'s (USA) System 919; experimental models from Japan's Fudjicu; and Nixdorf's (FRG) Datatel. Computing center equipment: Harris's (Austria) Schriber 1000 and 1000B; the Boewe-303, -321, and -401/3 from the FRG; and Sperry Remington's (Switzerland) RAND COM-500 SOM system. Minicomputer systems: NCR's (FRG) NCR-399; and Nixdorf's 8800-series systems, some of them utilizing floppy disks. A table of the specifications of Nixdorf's 8800-series minicomputer systems is provided. A note is made of the fact that somewhat of a dilemma

is being faced by manufacturers with regard to minicomputers versus large-capacity computers, in that minicomputers serve the needs of a vast market of small and medium-size businesses but do not have the flexibility of large computers, which, on the other hand, cost much more and, according to estimates, are only being used in some instances to 20 to 30 percent capacity. The turnover period for equipment and new designs and ideas is currently running at about every 2 years; consequently, plans have been made to hold another exhibition of data processing equipment in 1977: the "Sistemotekhnika-77." Table 1; references 2 (Russian).

USSR

SECOND ALL-UNION SYMPOSIUM ON PROBLEMS OF CONTROL IN COMMUNICATION NETWORKS AND CENTERS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Mar/Apr 77 pp 132-133

NIKITIN, ANDREY IVANOVICH, dr in technical sciences, IK AN USSR [Institute of Cybernetics, Ukrainian SSR Academy of Sciences], Kiev

[Abstract] The second All-Union Symposium on Problems of Control in Communication Networks and Centers held 6-10 September, 1976, in Kiev, was attended by 113 specialists representing 36 scientific and industrial organizations of the USSR. Some 77 reports were read, grouped into 11 main problem areas: investigation of the effectiveness of dynamic control; study of the parameters of a communication network as the situation in the network changes; the control system and the unswitched networks; algorithms for distribution of streams of messages in a switched network; distribution of streams of messages at a communication center; switching algorithms; the reliability of switching and control systems; testing and diagnosis systems for switching equipment and communication centers with program control; communication center software; physical and mathematical models of automatic switching systems; and planning methods. It was noted that a great deal of practical experience has been gained in the creation of traffic control systems for telephone and telegraph networks, and that the volume of research on the control of streams of messages in communication networks has greatly increased, and further that studies have begun in the area of the control of networks with batch switching.

USSR

# THIRD ALL-UNION SYMPOSIUM ON THE PROBLEM OF CREATION OF INFORMATION FORM CONVERTERS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Mar/Apr 77 pp 134-136

BAGATSKIY, VALENTIN ALEKSEYEVICH, engineer, IK AN USSR [Institute of Cybernetics, Ukrainian SSR Academy of Sciences], Kiev, KLOCHAN, PETR STEPANOVICH, junior research worker, IK AN USSR, Kiev, NIKITIN, SERGEY PAVLOVICH, graduate student KnI [Kiev Polytechnical Institute], Kiev, ROMANOV, VLADIMIR ALEKSANDROVICH, candidate in technical sciences, IKAN USSR, Kiev and STOKAY, VLADIMIR PAVLOVICH, engineer, IK AN USSR, Kiev

[Abstract] The Symposium was held in Kiev on 16-18 November 1976, dedicated to the 25th anniversary of the creation of the first domestic computer. The purpose of the symposium was to summarize the results of scientific research, planning, design and technological work in the area of creation of devices based on microelectronic circuits, designed to convert the forms of information, and to determine the trends of further developments in this area. Some 200 specialists of 102 organizations from 42 cities of the nation attended. There were 5 plenary reports and 130 reports in the four main sections of the symposium. At the plenary sections, reports were read on the following subjects: the progress of domestic information conversion technology; the basic theoretical and applied tasks in the area of information conversion equipment for the next 5 years; main trends in the unified system of analog-digital hybrid large integrated circuits; systems of digital modeling of information converters; the prospects for development of digital measurement devices and analog-digital converters; problems of the orientation and productivity of modern converters; and the use of Fibonacci codes in ADC and digital computers. The four sections at the symposium were dedicated to: algorithms, modeling and automation of the planning of converters; hardware and structural methods of improvement of converters; systems application of converters; and functional and computational converters. The fourt All-Union Symposium will be held in 1979.

USSR

PROBLEMS OF RELIABILITY IN THE PLANNING OF CONTROL SYSTEMS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Mar/Apr 77 pp 137-138

SAFONOB, IGOR' VADIMOVICH, candidate in technical sciences, Institute of Automatics, Kiev

[Abstract] The second All-Union Conference on Problems of Reliability in the planning of control systems was held at Chernovtsy on 22 October 1976. Over 200 representatives of 80 organizations and enterprises from 35 cities in the nation took part in the work of the conference. Subjects discussed included the development and application of various methods of increasing reliability and the primary tasks in reliability planning of automated management systems for technological and production processes; the problem of reliability analysis of control systems and various stages of their development; some approaches to the solution of the problem of reliability of man-machine systems; results of comparative analysis of the effectiveness of input information testing methods; methods of increasing the reliability of process control systems; organization and planning of operation of process control systems at various stages of their development; reliability of planning and reliability synthesis; reliability analysis, reliability optimization and maintenance; and checking and diagnosis. The third all-union conference will be held in 1978 at the republic computer center at Nal'chick.

USSR

THE FIFTH ALL-UNION CONFERENCE ON THE THEORY OF INVARIANCE, THE THEORY OF SENSITIVITY AND THEIR APPLICATIONS

Kiev AVTOMATIKA in Ukrainian No 2, Mar/Apr 77 pp 82-88

SEMENOV, V. M. and TUNIK, A. A.

[Abstract] The Fifth All-Union Conference on the Theory of Invariance, the Theory of Sensitivity and Their Applications was held in Kiev during October 1976, under the auspices of the Ukrainian SSR Academy of Sciences (Division of Mathematics, Mechanics and Cybernetics, and the Institute of Cybernetics), and the Kiev Territorial Group of the National Committee on Automatic Control, USSR. More than 100 scientists from various cities of the USSR delivered reports or lectures at the Conference. Outstanding contributions included the following:

"The Theory of Invariants in the Tasks of Automatic Control,"two lectures by O. I. KUTENKO (Kiev); "The Theory of Invariance, Sensitivity and Stability of Abstract Processes," a series of lectures by T. K. SIRAZETDINOV (Kazan'); "The Minimax Theory of Filtrations and Its Applications," a lecture by B. O. KURZHANS'KIY (Sverdlovsk); "Invariance and Stability in Nonlinear Automatic

Control Systems," a lecture by V. M. KUNTSEVYCH and M. M. KYCHAK (Kiev); "The Structure of the Spaces of the Parameters of Stable Large Systems," a lecture by O. M. CHYNAYEV (Kiev); "Some Problems in Observation Which Arise in the Theory of the Motion of Aircraft," a lecture by O. M. KOVAL'OV (Donetsk); "The Minimax Problem in Games Situations of Control with Incomplete Information," a lecture by O. I. NYKONOV [Sverdlovsk); "Use of the Theory of Sensitivity in Determining Permissible Variations of the Parameters of Control Systems," a lecture by V. L. VOLKOVICH and YE. P. LAVRYNENOK (Kiev); "Control and Stability of Logico-Dynamic Systems," a lecture by A. I. MAYSURADZE (Tbilisi); "Differential Equations in Variables, the Theory of Functions, Singularities and Catastrophes," a lecture by V. I. ARNOL'D (Moscow), in which Tom' River flooding was dealt with; "A Method of Invariants in Problems in the Equivalence of Ordinary Differential Equations," a series of lectures by L. M. MARKHASHOV (Moscow); "Aggregations and Hierarchical Structures of Dynamic Systems," a set of two lectures by YU. M. PAVLOVSKIY (Moscow); "Invariance of Dynamic Systems and Decompositions," a lecture by V. V. UDYLOV (Kiev); "The Group Approach to the Problems of Controllability, Invariance and Optimality," a lecture by G. M. YAGOVENKO (Moscow); "The Algorithmic Splitting of Systems of Nonlinear Differential Equations," a lecture by O. K. LOPATIN (Kiev); "The Principle of the Maximum for Systems in Variables," a report by V. M. MYKHALEVYCH (Kiev); three reports dealing with the analysis and synthesis of discrete invariant systems, by V. O. NIKOL'SKIY and M. P. SEVAST'YANOVA (Riga), V. V. VOLOSOV, V. M. KUNTSEVYCH and YU. M. CHEKHOV (Kiev), and N. D. NIKOLAYEVA, S. M. FEDOROV and V. I. SHILDOVSKIY (Leningrad).

In addition to these, a number of reports dealt with general problems in the theory of the invariance of automatic systems, problems of basically practical significance, analysis and synthesis of self-adjusting control systems, the creation of automatic systems, and various other theoretical aspects of the general field.

It is believed that the Conference furthered the orientation of scientists, specialists and planners in the general field of invariance and its applications. A number of guidelines were laid out, and recommendations for research efforts and effective collaboration among interested specialists and organizations were made.

USSR

SEMINAR ON AUTOMATED MANAGEMENT SYSTEMS IN METALLURGICAL PRODUCTION

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, 1977 p 58

FILIMONOV, YU. S., candidate in technical sciences and GOLANT, YU. A., engineer

[Abstract] A seminar was held in Kiev in October 1976: "Experience in Developing and Introducing Management Systems in Metallurgical Production." It was organized by the Republic Home of Economic and Scientific-Technical Propaganda and the Kiev Institute of Automation imeni 25th CPSU Congress. The 60 seminar participants came from 22 organizations. B. B. Timofeyev (Corresponding Member, Ukrainian SSR Academy of Sciences) presented a paper, "Main Directions and Problems in Automation in Light of the Decisions of the 25th CPSU Congress." He noted that automating the designing of ASU [automated management systems] in metallurgical production takes on urgency because of the broader work done on ASU and the need to develop model design solutions. In his paper, Dr of Technical Sciences A. Z. Grishchenko compared digital and analog regulators and noted the need for a systems approach to developing ASU. He believes that many control algorithms have national value and often their publication without prior sale of licenses is premature. Information-programming software for a cold-rolling shop at the Novolipetsk Metallurgical Plant was described in a paper by Candidate in Technical Sciences V. M. Afinogenov. Eighteen other papers were delivered. Reference 1 (Russian).

USSR

SOVIET-AMERICAN COOPERATION IN THE COMPUTER TECHNOLOGY AREA

Yerevan KOMMUNIST in Russian 30 Mar 77 p 4

[Text] The fifth meeting of the Joint Coordinating Group for Cooperation in the Computer Technology Area took place in Yerevan on 29 March between the State Committee for Science and Technology of the USSR Council of Ministers and the American firm "Control Data Corporation." The chief of a Department of the State Committee, V. A. Myasnikov, and the Vice-President of the American firm Robert Wessland signed a report of the meeting's results.

The co-chairman of the coordinating group on the American side Robert Wessland stated in a meeting with an Armenian Press correspondent:

"During the meeting which took place in Armenia, we had a very effective dialogue and discussed the most important issues in those areas of our mutual interest. In my view, this fifth meeting has been the most fruitful of the five. As a whole, it was most productive, a fact we note with great satisfaction. We express our deep gratitude to all those official representatives who expended great effort on our coordinating group. Our acquaintance with

your country's representatives has been truly satisfactory, and we are convinced that they are good and gracious hosts. The elegance and comfort furnished us by those who organized the meetings on such a high level was especially appreciated and brightened our outlook on Armenia.

Many of us have Armenian friends in the U.S.A. Thus it was especially interesting to visit their homeland. The USA delegation hopes to have the opportunity to visit this lovely Soviet Republic again in the near future."

The Soviet co-chairman of the coordinating group, Chief of the Computer Technology and Control Systems Department of the USSR State Committee for Science and Technology, V. A. Myasnikov, stated:

"The meeting of the coordinating group took place in a businesslike atmosphere. The following questions were discussed: development of a system of compensation for Soviet printing production, installation at the USSR State Committee for Printing of a modern electronic computer and software support, details of the transfer of the instructional system PLATO IV to the Soviets, transfer to the Soviet Union on a compensated basis of the equipment for producing magnetic disk storage devices for computer control, and the possibility of joint development and production of perspective electronic computer machinery constructed on nontraditional principles (recursive computers).

The two sides agreed at the meeting to conduct seminars in the USA in 1977. These would be to discuss using computers machines in health care and education. These and other questions were expressed in the current report.

One must mention the efforts of the Control Data Corporation leadership--Board Chairman William Norris and Executive Vice-President Robert Schmidt--toward establishing mutual cooperation between the Soviet Union and the USA in the areas of economics, science and technology. Seminars at which Soviet scientists spoke were organized in the USA. In 1976 representatives of the USSR Ministry for Instrument Making, Automation Equipment and Control Systems lectured on our achievements in the areas of automation of complex technological processes.

In conclusion, in the name of all the meeting's participants, I wish to express our deep appreciation to the government of the Armenian SSR for its cooperation and great help during the fifth meeting of the coordinating group in Yerevan.

USSR

PHOTO CAPTION

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 3, May/Jun 77 photo inside front cover; caption p 144

[Text] One of the machine rooms of the Computer Center of the Institute of Cybernetics, Ukrainian Academy of Sciences SSR.


USSR

COMMUNICATIONS FOR STUDY OF SCIENTIFIC COMMUNICATIONS

Moscow PRIRODA in Russian No 9, 1977 pp 152-154

STAROSTIN, B. A., candidate in biological sciences, Moscow

[Abstract] This article reviews the periodical MEZHDUNARODNYY FORUM PO INFORMATSII I DOKUMENTATSII [International Forum on Information and Documentation] which has been published in Russian since 1975 by the All-Union Institute of Scientific and Technical Information in Moscow and is issued by the International Federation for Documentation (Belgium). The leading theme of past issues has been scientific communications. Attention has been paid to the technical aspects of scientific communication and documentation, with particular emphasis on the interaction between man and the computer. Articles have been devoted to ways of improving communication between man and the computer and to replacing communications written on paper by electronic communications and electronic memories. The "electronic" aspects of communication are discussed in the periodical from two viewpoints: Adapting man to the computer; and adapting the computer to man. The course of development of electronic equipment in the 20th century has followed the second approach, as evidenced by the fact that the journal COMPUTERS AND AUTOMATION changed its name in 1974 to COMPUTERS AND PEOPLE. Moreover, articles have appeared in the periodical under review which deal with "humanizing" computers. On the other hand, some articles have pursued the opposite trend. A French writer, for example, recommended that authors writing in French adapt their style so that it is in a form which can be processed by machine translators, that is, that they avoid syntactic inversions. This is plausible, but other suggestions are not. A Dutch writer, for example, in an article entitled "Educating the Information User," suggested a school for 4-12-year olds in which pupils have at their disposal an extensive catalog designed according to the principle of key words. E.g., Key word: "Potato;" index cards: P-7; illustrations: P 144, P 23; slides: S 11, No 6. This would train people at an early age to adapt to computers. Another interesting aspect treated in this periodical is information science as a strategy for coping with the future. An article by another Dutch writer advanced the theory that the fall and decline of the Roman Empire was caused by the fact that expansion of the empire was accompanied by an ever increasing flow of information. A point was reached where the excess of information became so significant that the paralyzed administration could not evaluate it, which resulted in an inability to react appropriately, which resulted in the fall. The reviewer's interpretation is that the Romans' policy of using slaves as their source of productive strength became an obstacle to the use of socially important information, especially of the information afforded by science. The reviewer's intimation is that we must beware today of making the same mistake. The reviewer's final assessment of the periodical is that it is a valuable addition to communications so necessary for studying communications themselves.

CSO: 1863 - END -